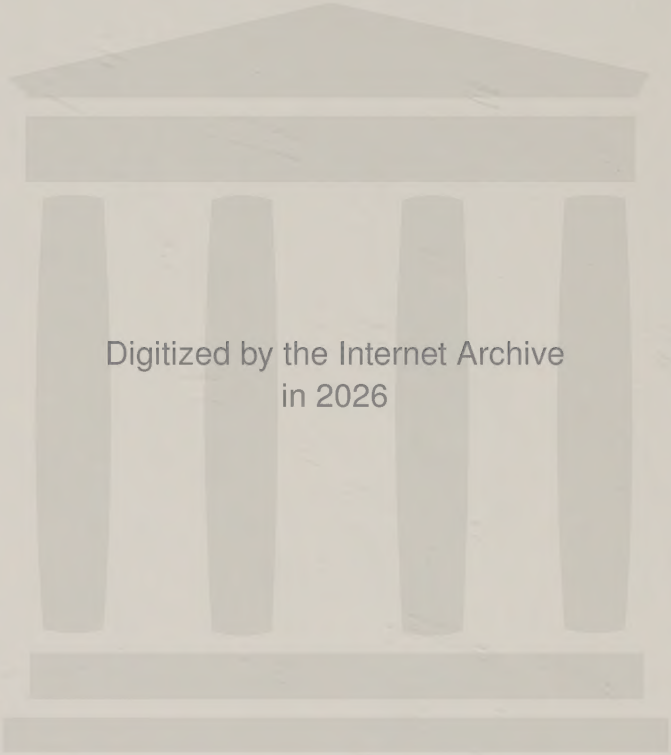
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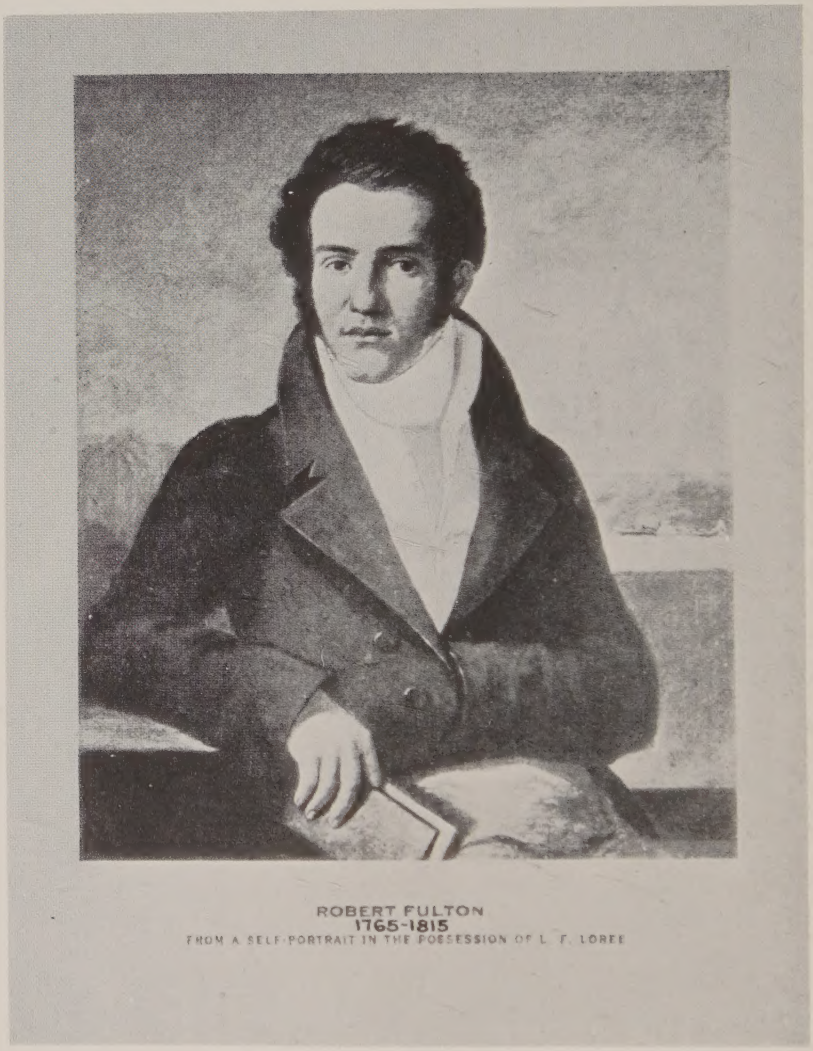
# ROBERT FULTON
AND THE
# SUBMARINE




PORTRAIT OF FULTON

# ROBERT FULTON
## AND
# THE SUBMARINE

BY
WM. BARCLAY PARSONS

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*To*

A. R. P.

WHO IN THE LINE OF DUTY DURING THE WORLD WAR
CROSSED AND RECROSSED THE HOSTILE SUBMARINE ZONE
THIS ACCOUNT OF THE FIRST SUBMARINE
IS INSCRIBED

W. B. P.

# FOREWORD

That Robert Fulton devoted some attention to the possibility of an underwater boat during the years when his mind was laboring with plans for the propulsion of boats by steam, has been known since that time. Not, however, until 1896, did it become clear to what extent he had carried his ideas. In that year Lieut. Emile Duboc discovered in the Archives Nationales in Paris the full account of Fulton's negotiations with the French Government and the plans of the boat that he had constructed, and in which he actually plunged. Other investigators, chiefly Lieut. Maurice Delpeuch of the French navy and Mr. S. L. Pesce, have made public this interesting record. To their respective treatises, " Les Sous-Marines à travers les Siècles " and " La Navigation sous marine " the author of this book is indebted for much information.

It was also known that Fulton left France for England in 1804 presumably to work for the government of the latter country in the development of torpedoes. It has been supposed that he made some suggestions for a submarine, suggestions that were not taken seriously. His first biographer, Cadwallader D. Colden, and his own published writings make no reference to an underwater boat. But such a boat was the basis and essence of his work and not merely an incidental suggestion. The lack of knowledge and consequently the erroneous supposition are due to the fact that what he actually proposed to the government was purposely kept secret for political reasons. A manuscript wholly in Fulton's handwriting, signed in three places, and large, carefully

executed water-colored drawings made and each signed by him have recently been found in England. This manuscript and drawings show that the main idea that he laid before the British Government was a sea-going submarine vastly superior to the one that he had previously submitted to the French authorities. The manuscript and other substantiating documents and letters that have been examined prove clearly that it was alarm on the part of the British Admiralty regarding his initial French submarine that led the government to induce Fulton to go to England and place himself and his devices unreservedly at their service.

This record, now published for the first time, shows that Robert Fulton was unquestionably the first one to design a practical vessel capable of submerging and rising at will, that could keep the sea for an extended period of time with a large crew, and that could be propelled either on or beneath the surface, or that could lie safely at anchor under either condition. The record also shows that Fulton foresaw with extraordinary clearness conditions that might arise, and which actually did come to pass in the great war recently ended.

Fulton's manuscripts and letters are reprinted exactly as he wrote them so far as access has been had to the originals, words that he erased are enclosed in brackets. Some of his letters taken from books have evidently been corrected in their orthography before publication. In such cases the published text has been followed.

In the preparation of this book the author has been assisted, and for which assistance he makes grateful recognition, by Mrs. Alice Crary Sutcliffe and Mr. Edward C. Cammann, descendants of Mr. Fulton, who have kindly placed at the author's use their great grandfather's papers; by Mr. L. F. Loree who did the same with his collection of Fultoniana; by the British Ambassador who procured a search of the British Govern-

ment records, and by the New Jersey Historical Society. The author has drawn from a number of works on Fulton, particularly the biography by Colden (1817) and "Robert Fulton" by H. A. Dickenson (1913), as well as the French volumes above mentioned.

Wm. Barclay Parsons

New York, 1922.

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# ROBERT FULTON AND THE SUBMARINE

## Chapter I

## FROM ART TO ENGINEERING

Instructions to Barlow regarding the "Drawings and Descriptions." Fulton's youth (1765–1782). Residence in England studying art (1786–1793). Change from art to engineering as a vocation (1793). Arrival in France (1798).

". . . . I am now busy winding up everything and will leave London about the 23rd inst. for Falmouth from whence I shall sail in the packet the first week in October and be with you, I hope, in November, perhaps about the 14th, my birthday, so you must have a roast goose ready. The packet, being well manned and provided will be more commodious and safe for an autumn passage, and I think there will be little or no risk; at least I prefer taking all the risk there is to idling here a winter. But although there is not much risk, yet accidents may happen, and that the produce of my studies and experience may not be lost to my country, I have made out a complete set of drawings and descriptions of my whole system of submarine attack. . . . These with my *will,* I shall put in a tin cylinder, sealed and leave them in the care of General Lyman, not to be opened unless I am lost. Should such an event happen, I have left you the means to publish these works, with engravings, in a handsome manner, and to which you will add your own ideas — showing how the liberty of the seas may be gained by such means."

Thus Robert Fulton wrote to Joel Barlow who had been his close friend and faithful guide since his arrival in Paris in 1797. The letter of which the above is but an extract is dated London, September, 1806, and was written, as the context shows, on the eve of his final departure from England, after a residence abroad of nearly twenty years. General Lyman to whom he referred had been appointed American Consul in London in 1805, in which capacity he served until he died in 1811.

Joel Barlow was in his day a person of considerable importance. Born in 1754, in Connecticut, educated at Dartmouth and Yale, he first studied theology and then law. Though he practised these professions in turn for a short time, he retired from both to devote himself to literature. In 1788, he went to London and Paris to market some lands in Ohio, an unfortunate undertaking. While in Europe, he became interested in liberal politics, even to the extent of standing as a candidate for election to the French Convention of 1793. After having acquired a competence in commerce, and after a short but highly creditable service as American Consul at Algiers, he returned to Paris and resumed his literary life, his principal production being a poem entitled, "The Columbiad." In 1805, he returned to America, remaining there until 1811, when he was appointed American Commissioner to Emperor Napoleon. He joined the latter at Vilna in 1812, during the Russian campaign and, as the result of exposure to inclement conditions on the disastrous retreat from Moscow in the same year, died in Poland on Christmas eve. Barlow was enough older than Fulton to be accepted not only as a friend, but as a counsellor, while his character, experience and views on world questions appealed to the enthusiastic younger American in whom there was curiously blended a high development of an artistic temperament and scientific genius, and who was in

thorough sympathy with the extreme liberal movement of the period that Barlow to some extent approved.

When Fulton arrived in Paris in 1797, he at once called on Barlow. The two men were mutually attracted and there soon sprang up an intimacy that was to develop into the most affectionate friendship. This intimacy has been compared to that existing between father and son, or rather between parents and son because Mrs. Barlow joined with her husband in taking Fulton into their lives. This they did the more readily as they had no children of their own. As evidence of the relation, they gave Fulton the nickname of " Toot."

Cadwallader D. Colden, in his biographical memoir of Fulton, finds no fitter words to describe this friendship than by quoting as he says, " the warm language of one who participated in the sentiments expressed." From this description of the quotation by Colden, it is evident that the words were those of Mrs. Barlow herself, who was still alive when Colden was writing the memoir in 1817. The quotation that Colden gives is as follows:

> Here commenced that strong affection, that devoted attachment, that real friendship which subsisted in a most extraordinary degree between Mr. Barlow and Mr. Fulton during their lives. Soon after Mr. Fulton's arrival in Paris, Mr. Barlow removed to his own hotel and invited Mr. Fulton to reside with him. Mr. Fulton lived seven years in Mr. Barlow's family, during which time he learnt the French and something of the Italian and German languages. He also studied the high mathematics, chymistry and perspective, and acquired that science which, when united with his uncommon natural genius, gave him so great a superiority over many of those who, with some talents but without any sort of science, have pretended to be his rivals.

The house in which the Barlows lived in Paris and where Fulton lived with them for much of the time, was

No. 59, Rue Vaugirard. The above quotation gives a suggestion of what the Barlows must have been to Fulton during his struggles in a foreign land, with visions of success almost attained alternating with bitter disappointments. It was but natural that the affection of Joel Barlow should be reciprocated and, consequently, when facing in 1806 the then not inconsiderable danger of a transatlantic voyage, it was to Barlow that he entrusted the task of publishing the results of the discoveries and of his labors, should he be lost at sea.

Fulton, as we know, reached America safely and, therefore, Barlow was not called on to publish the "drawings and descriptions" that Fulton had left behind in England. Due to the fact that Fulton lived for some years and became very prominent in the successful development of steam navigation, the drawings and accompanying manuscripts of a device that had not attained practical recognition seemed to have for the moment comparatively small value or importance and were put aside, perhaps after the death of Consul Lyman. They made no appearance until 1870, when they were sold at auction by a Mr. Andrews of Swarland Hall, Felton, Northumberland, and apparently without attracting any comment. Then for a period of 50 years, they rested quietly and unknown to the general public in the family of the purchaser. In 1920, they once more changed owners and passed into the possession of the writer. Now after a lapse of 116 years, the request of Fulton to his dearest friend, Barlow, a request that he realized when he made it might be his last, will be complied with, and the interesting story of his work through several years be made of record.

Could Fulton have foreseen the development that his conception of submarine navigation would attain, it is well within the limit of probability that he would have preferred that publication of his plans be withheld until

the basic principle had reached its present status of complete application. Though he lived more than eight years after writing his letter to Barlow, he made no effort to publish his plans, nor did he in any of his subsequent writings refer to his submarine idea nor what he had done in England. Apparently his sole thought of publishing was in the event of his being lost at sea on his return. If he could not carry his conception of submarine attack into actual execution, he apparently preferred that his plans be allowed to rest quietly in some English private library until the idea that he had espoused had taken actual practical form, and the principles that he advocated had been proved true. Absorbed at first on his return to America in the construction of his steamboat, perhaps he realized in the interval between 1806 and his death in 1815, that the world was not yet ready to receive the innovation of sub-surface navigation, that the state of the art of engine construction had not yet been advanced sufficiently to render the theory feasible and, consequently, that publication might have detracted from his fame as an engineer by apparently showing that he was a dreamer. Sometimes it is a misfortune to be ahead of the times. Better to wait until proved facts entitle one to be accorded praise as a man of vision, rather than through premature publication to be classed as a visionary man.

Robert Fulton was born on the 14th November, 1765, on his father's farm on Conowingo Creek in Little Britain Township, Pennsylvania. His father, Robert Fulton, Sr., was of Scottish descent. To his mother, Mary Smith, a woman of force and intelligence, young Robert owed his early education, and from her he derived the personal qualities that were to make him distinguished. His father was not successful as a farmer, so that when he died in 1768 he left his widow and five children in very straightened circumstances.

Of the five children, three were girls, and of the boys, Robert was the elder.

This story is not concerned with the history of the Fulton family which has been thoroughly set forth by others, except to recall those salient steps in Robert's career that led to his investigation of the possibilities of submarine navigation, and the designing of a boat to accomplish the end so far as the then state of the art of boat and engine construction would permit.

At school he did not excel in his studies which he neglected for sketching and mechanical experiments. When he was seventeen years of age, he set out to make his own career. As the village of Lancaster, where he was living with his mother, offered narrowly limited opportunities, he went to Philadelphia, then in many respects the most important city in the colonies. Not much is known of his early struggles, though apparently he devoted part of his time to art, because the City Directory in 1786, puts him down as a miniature painter, and some of his miniatures are in existence. Under the patronage of Benjamin Franklin, he made progress and earned enough money to purchase a farm for his mother.

But the spirit that was within him — the spirit that was to record his name indelibly in history — led him to think of the greater world that lay beyond the colonies, even though the colonies were at last successful in their struggle for independence and were then engaged in the equally difficult and more prolonged struggle to weld themselves into a nation. In 1786, he sailed for England provided only with a letter from his protector, Franklin, to Benjamin West. At that time West was approaching the height of his career as painter in London, being chosen president of the Royal Academy in 1792. Under the guidance of and probable instruction by West, Fulton made progress as an artist, the Royal Academy accepting some of his pictures.

The path of a young artist is rarely a smooth one. It is no smoother when the young artist is working in a foreign land without fame, friends or private means. What Fulton did and how he lived in London during the first four years of his stay in England, is best told by himself in his own words, in a letter to his mother under date of January 20, 1792, a letter given at full length by Dickenson.

. . . . And I must now Give Some little history of my life since I Came to London. I Brought not more than 40 Guineas to England and was set down in a strange Country without a friend and only one letter of Introduction to Mr. West — here I had an art to learn by which I was to earn my bread but little to support whilst I was doing it And numbers of Eminent Men of the same profession which I must Excell before I Could hope to live —, Many Many a Silant solitary hour have I spent in the most unnerved Studdy Anxiously pondering how to make funds to support me till the fruits of my labours should sifficant to repay them. Thus I went on for near four years — happily beloved by all who knew me or I had long ear now been Crushed by Poverties Cold wind — and Freezing Rain — till last Summer I was Invited by Lord Courtney down to his Country seat to paint a picture of him which gave his Lordship so much pleasure that he has introduced me to all his Friends — And it is but just now that I am beginning to get a little money and pay some debtt which I was obliged to Contract so I hope in about 6 months to be clear with the world or in other words out of debt and then start fair to Make all I Can.

In 1793, when he was on the very threshold of a successful career as an artist, he suddenly, and without any explanation that is known, gave up the art of painting and turned to the science of engineering as his life's vocation. It is an interesting fact that two great American engineers — Fulton who made steam navigation practical, and Morse who did the same for the electric telegraph — were both artists before they became

engineers. The only hint as to the cause of his change of occupation is given by himself in the introduction to his first and greatest literary production, " A Treatise on the Improvement of Canal Navigation," which appeared in 1796. In this introduction he said: " On perusing a paper descriptive of a canal projected by the Earl of Stanhope in 1793, where many difficulties seem to arise, my thoughts were first awakened to this subject."

But Fulton in 1796 was something more than an author and investigator of canals. He was at that date actually in the field as a practicing engineer as is shown by a printed report, dated London, November 24th, 1796, addressed to " Sir Francis Buller, Bart. and the Gentlemen interested in the Helston Canal." This report is of particular interest in that it is not recorded in any Fulton bibliography and no copy is to be found in the British Museum, or in the Congressional or other American public libraries. Perhaps the copy lying before the writer is the sole survivor. The edition was undoubtedly very small and the few copies, as soon as immediate interest was lost, were likely to be thrown aside as of no value. The title page is reproduced in facsimile on the opposite page.

Now as an addition to the Fulton bibliography, this, his second book and first published account of his own engineering work, is of importance and merits a brief description.

The pamphlet consists of fifteen pages, those of the copy referred to measuring $4\frac{7}{8}$ by $7\frac{3}{4}$ inches, with an engraved map $10\frac{3}{4}$ by $7\frac{3}{4}$ inches, showing the route of the proposed canal from the headwaters of St. Ives Bay to the navigable waters of the Helford River in Cornwall.

The report possesses no scientific or constructive value. It presents neither plans nor details, except

# REPORT

ON THE

# PROPOSED CANAL

BETWEEN THE

RIVERS

# *HEYL* AND *HELFORD.*

BY

ROBERT FULTON,

*ENGINEER.*

estimates of cost and earnings, obviously imperfect. Had Sir Francis and his friends followed the advice of their professional advisor, it is probable that they would have suffered financial disappointment. The report, however, is full of a young man's optimistic hopes, a spirit of altruism and a plea for economy. These are sentiments that always actuated Fulton and frequently find expression in his other writings. It is not impossible, in fact it is quite probable, that a desire to be of tangible service to others was one of the compelling reasons that led him to devote himself to construction rather than to art. The underlying thought on which this report is based is shown by the following extracts in which Fulton after pointing out how in his professional opinion he believes that the operations of this enterprise will be lucrative, gives his own views of such undertakings as follows:

> But I hope the gentlemen of Cornwall will view them in a better light; and, considering them as of national utility, contemplate the infinite advantages they give to the numerous operations of society. . . .
>
> In such investigation, if by a facility in carriage I find the expence of manure reduced, I then see that the farmer may improve more land, give a greater polish to his estates, and nourish agriculture to the benefit of the mass of society and the emolument of his landlord. . . .
>
> In towns, if the grocers, carpenters, ironmongers, or other tradesmen, have the carriage of their commodities reduced, they or their customers are benefitted; and so on in all professions where much carriage is required. If the housekeeper or cottager have their coals reduced, the comfort becomes more extended. In fact there is no point in which a canal can be viewed but it exhibits advantages to the mass of the people; and for an evident reason, because all improvements which reduce manual labour, or which give a greater produce with the same quantity of labour, will render the conveniences of life more abundant, cheap and diffused. . . .

By 1786, Fulton had definitely devoted himself to canal engineering, or, as he says himself in the Report of the Board of Commissioners of the Western Canal, published at Albany and dated February 22, 1814:

> I passed three years at various canals in England to obtain practical knowledge on the manner of constructing them and to make myself familiar with their advantages.

With Fulton's work on canals, his designs for inclined planes to take the place of locks, his financial difficulties and his acquaintance with the Earl of Stanhope, the present story has no concern, except as such work is the intermediate step in Fulton's career between art and mechanical navigation.

That Fulton was sorely pressed as to money in these days, the following extract from a long letter addressed to Lord Stanhope, and given in full in Dickenson's "Robert Fulton," clearly proves:

> Works of this kind Require much time, Patience and application. And till they are Brought About, Penury frequently Presses hard on the Projector; And this My Lord is so much my Case at this Moment, That I am now Sitting Reduced to half a Crown, Without knowing Where to obtain a shilling for some months. This my Lord is an awkward sensation to a feeling Mind, which would devote every minuet to Increase the Comforts of Mankind. And Who on Looking Round Sees thousands nursed in the Lap of fortune, grown to maturity, And now Spending their time In the endless Maze of Idle dissipation. Thus Circumstanced My Lord, would it be an Intrusion on your goodness and Philanthropy to Request the Loan of 20 guineas Which I will Return as Soon as possible. And the favour shall ever be greetfully Acknowledged By your lordship's
>
> Most obliged
>
> Robert Fulton

In 1797, Fulton conceived the idea of making a short trip to France and then returning to America. From

various letters he appears to have had expectations, or perhaps they were only hopes, that he could find opportunity to apply his canal ideas in his own country. Accordingly, the summer of 1797 finds him in France en route for America. But instead of tarrying for a few weeks as he had in mind, he remained seven fruitful and critical years.

In France he began at once to devote himself, as he had been doing in England, to the development of small canals, republishing in French his "Treatise on Canals" under the title, "Recherches sur les Moyens de Perfectionner les Canaux de Navigation, etc." It bore date an 7, the French revolutionary equivalent to 1799, and contained not only all the matter of the English edition of 1796, but also new material of particular application to France. In 1798, he was granted a French patent for certain details of canal construction, and in the same year attempted to secure the interest of Napoleon in the utilization of his ideas. The letter in which he makes the attempt was written in French, and a copy made by Fulton is now preserved in the New York Public Library.[1]

To General Bounaparte
Citizen General

Citizen Perier having advised me that you desire to know of my work on the System of Small Canals, I take the liberty of presenting you a copy of that book, only too happy if you will find therein some means of improving the industry of the French Republic.

[1] Au Général Bounaparte,
Citoyen General

Le Cn Perier m'ayant appris que vous desiriez connaître mon Travail sur le Systême des Petits Canaux, je prends la liberté de vous présenter une copie de cet ouvrage, trop heureux si vous y trouvez quelques Moyens d'ameliorer l'industrie de la République Française

. . . . . .

Parmi toutes les Causes des Guerres chaque jour, il est vrai, voit disparaître

Of all the causes of War, every day, it is true, sees those disappear which appertain to the existence of kings, priests and all that accompany them. But, nevertheless, republics will not be free of these lamentable properties so long as they do not free themselves from the erroneous systems of *exclusive commerce and distant possessions.* It is therefore a reason for every man who loves his fellows to endeavor to destroy these errors. Even ambition cannot seek a greater glory than in pointing out to men the path of truth and removing obstacles that impede nations from arriving at a durable peace. What glory can stand against time if it does not receive the approval of philosophy? In order to free nations, Citizen Bounaparte, you have executed vast enterprises and the glory with which you are covered should be as permanent as time itself. Who then can support with more efficacious approbation, projects which contribute to the general welfare? It is with this idea that I submit to you my work, hoping that if you find therein

---

celles qui tiénnent a l'existence des Rois, des prêtres, et de ce qui les accompagne. Mais neanmoins les Républiques elles-mêmes ne seront pas à l'abri de ces funestes querrelles, tant qu'elles ne se dèferont pas de ces Systêmes erronés de Commerce *exclusif et de Possessions lointaines.* C'est donc un motif pour tout homme qui aime ses semblables de chercher a détruire ces erreurs; l'Ambition même ne doit plus Chercher la gloire qu'en montrant aux hommes le chemin de la vérité, et en écartant les obstacles qui empêchent les nations d'arriver à une paix durable; Car, quelle Gloire peut resister au temps, — si elle ne reçoit la Sanction de La Philosophie?

Pour affranchir les Nations, Citoyen Général, vous avez exécuté de vaste entreprises, et la gloire dont vous vous êtes couvert, doit être aussi durable que le temps; qui donc pourrait seconder d'une approbation plus efficace des projets qui peuvent Contribuer au bien Général? C'est dans cette idée que je vous soumets mon Travail, espérant que si vous y rencontrez quelques vérités utiles, vous daignerez les appuyer d'une influence aussi puissante que la Vôtre; et en effet, favoriser des projets dont l'exécution doit rendre des millions d'homme heureux, peut-il être pour le genie vertueux de plus delicieuse jouissance? C'est sous ce point de vue que les améliorations intérieures et la Liberté du Commerce Sont de la plus haute importance. —

Si le Succés couronne les efforts de la France, Contre l'Angleterre, il ne tiendra qu'à elle de terminer Glorieusement cette longue Guerre, en donnant la liberté au Commerce et en faisant Adopter le Systême aux autres puissances; La liberté politique acquerra ainsi le dégré de perfection et d'etendue dont elle est susceptible, et la Philosophie verra avec joie l'olivier d'une paix éternelle ombrager la Carriére des Sciences et de l'Industrie.

Salut et respect

*Paris 12 floreal an 6*

Robert Fulton

any useable truths that you will deign to support them with an influence as powerful as your own, and in effect to patronize projects the execution of which should render millions of men happy. Can there be for virtuous genius a more delicious reward? It is from this point of view that interior improvements and freedom of commerce are of the highest importance.

Should success crown the efforts of France against England, there will remain but gloriously to terminate this long war, to give freedom to commerce and make other powers adopt the system. Political liberty will then acquire that degree of perfection and breadth of which it is susceptible and philosophy will see with joy the olive branch of an eternal peace shade the course of science and industry.

This letter possesses two great points of interest. One that it marks the first approach of Fulton to Napoleon, leading as will be seen below to a far more important suggestion than that of building small canals; and the other that it is animated by an intense desire for French success over England. That this was in the beginning Fulton's hope is to be borne in mind when, as will be shown, having developed in 1804 the opposite or pro-British sympathy, he lived and worked during two years in England for the destruction of Napoleon's power though perhaps not of French ascendancy. The letter speaks of a "lasting peace." That is something that the same nations a century and a quarter later are still seeking.

How delightfully charming and naïve is Fulton's confidence that his picture of an altruistic ambition would excite a sympathetic emotion in Bonaparte. If Napoleon read the letter he must have smiled at Fulton's enthusiastic simplicity.

Fulton's leaning to French views at this time is explained by the fact that in politics he was intensely republican, in fact, somewhat extreme, a position that was undoubtedly encouraged and strengthened by his

mentor, Barlow, who we have seen was a candidate for the celebrated Convention of 1793. This same leaning very likely influenced his remaining in France, rather than undertaking his contemplated return to his native land, because at this period his political ideals seemed more probable of realization in the former than in the latter country.

## Chapter II

# EARLY ATTEMPTS AT SUB-SURFACE NAVIGATION

Fulton's first efforts for mechanical navigation. Some early submarines: Bourne, Van Drebbel, Mercenne, de Son, Wilkins, Bushnell.

While Fulton was taking out patents for his little canals — patents that never had either practical or profitable application — and endeavoring to earn a livelihood through the introduction of some of his methods of canal construction, there was germinating in his mind the great principle of mechanical propulsion on water that was eventually to win for him both fame and a competence.

The seeds had found lodgment some years previously. Dickenson shows that in 1793, or about the time when he retired from his art career, Fulton wrote a letter to the Earl of Stanhope stating that he had a project for moving boats by steam. This was a subject in which Stanhope took particular interest, being an inventor and a great student of applied science, and especially as he at that same time was working on a design of his own for a steamboat. Lord Stanhope requested Fulton to present his plan in detail. The original letter and accompanying sketches, dated November 4th, 1793, are still in the possession of the Stanhope family.

The idea of propelling boats by steam was not new. Jonathan Hulls had published a pamphlet in 1737 entitled, " A Description and Draught of a New Invented Machine for Carrying Vessels Out of or Into Any Harbour, Port or River, Against Wind or Tide or in

a Calm." This pamphlet is of great rarity, and the plate it contains, being the first pictorial representation of a boat propelled by the force of steam, merits reproduction. But in Fulton's own country practical results had already been achieved. James Rumsey had actually moved a vessel by steam on the Potomac in 1785–88, and in 1788 and 1790 took out British patents. In February, 1793, Rumsey ran a steamboat on the Thames. Equally important was the work of John Fitch, who also constructed a boat operated by a steam engine and actually conveyed passengers on a regular schedule on the Delaware River in 1790. Fitch, like his rival inventor Rumsey, went to Europe further to develop his ideas and, in 1791, took out a French patent. All these experiments were, of course, known to Fulton and it is not impossible that they gave him his first suggestion.

For the moment we are not interested in the development of steam navigation. However fascinating the story of how Fulton gradually developed a better engine than his predecessors and contemporary experimenters had succeeded in doing, and one that was completely practical, it is not to be repeated here. Our story is concerned with his work on submarines, but before leaving the subject of steamboats, it is convenient to recall that the fortuitous appointment of Robert R. Livingston (1746–1813), the famous Chancellor of the State of New York, as American Minister to France in 1801 brought to Fulton his ultimate means of success through the partnership that the two men established. Chancellor Livingston, like Fulton's other friend, Lord Stanhope, was interested in philosophical subjects and had turned his attention to the possibility of steam navigation as early as 1798. Therefore, his arrival in France in 1801, when Fulton was struggling with the mechanical problems, was most opportune for Fulton and the art of mechanical propulsion. Though Fulton

JONATHAN HULLS' STEAMBOAT, 1737

even then had almost reached the solution of the engineering difficulties, he was without the necessary funds to put his ideas in concrete form. These funds Livingston supplied, and, what to a man of Fulton's temperament was almost as valuable, personal encouragement and guidance. It is not too much to assert that the early realization of the application of steam to navigation was due to Livingston's acceptance of the post of Minister to France, thus bringing the two men together.

While Fulton was studying and experimenting with mechanical propulsion of boats on the surface of the water, it was but natural that he should take under consideration the possibility of constructing a boat that could be sunk and raised at will and move under water. This basal principle was far from being novel. From the earliest times man has not been content to remain only a land animal. As far back as records go, he has had the ambition to emulate the birds, and certainly during the Roman period he began to think of sharing with fishes the power to explore the depths of the sea.

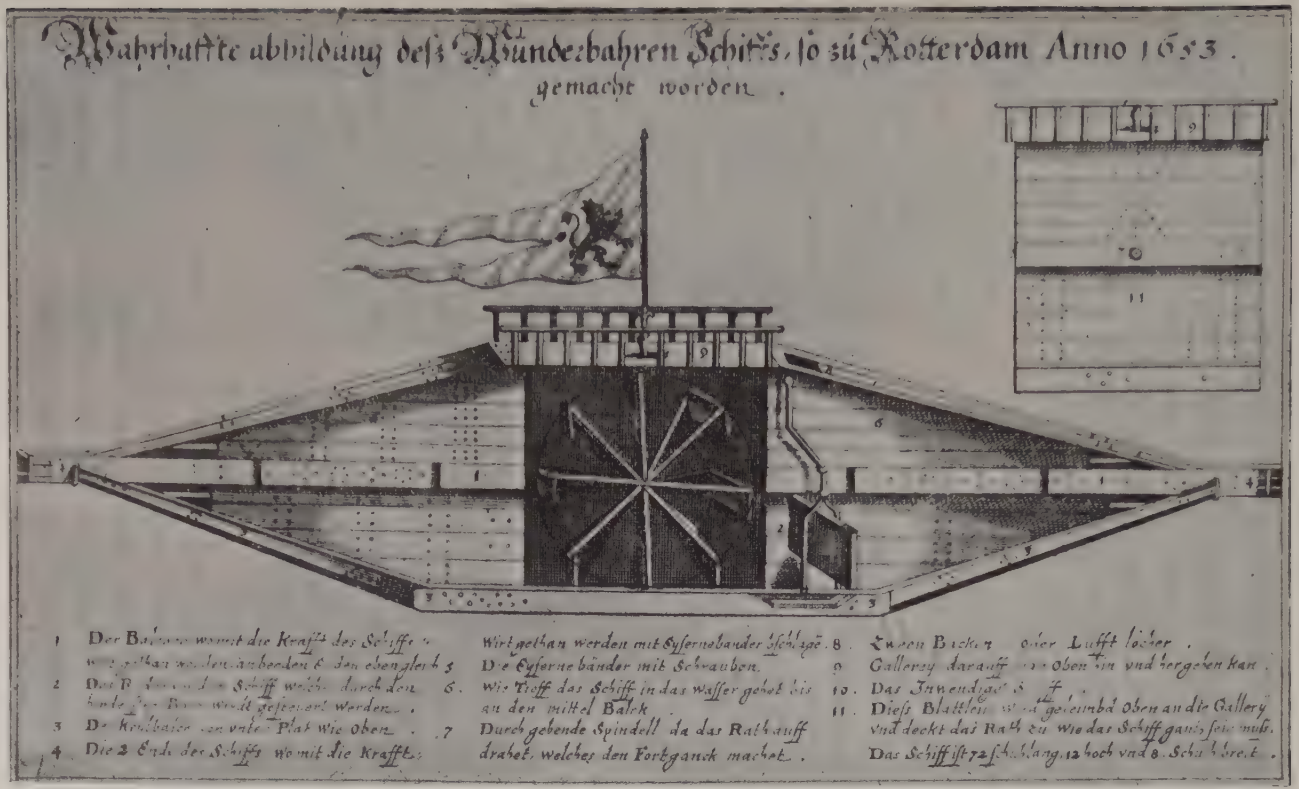
Perhaps William Bourne was the first writer on submarine vessel design. In his little quarto volume published in 1573, and entitled, " Inuentions or Deuises very necessary for all Generalles and Captaines, or Leaders of Men, as well by Sea as by Land," he describes as the " 18 Deuise," " a Ship or a Boate that may goe vnder the water vnto the bottome, and so to come vp againe at your pleasure." Recognizing that the variation in displacement of a vessel whose weight remains constant adds to or detracts from its buoyancy, he suggested a vessel with sides that could be distended or contracted at will by screws, thus permitting her to sink and rise. These distendable sides, he thought, might be made of leather. For ventilation when submerged, he would have a hollow mast, taking care that the depth of water in which the boat should plunge

would never exceed the height of the mast. He did not propose any means of propulsion.

Van Drebbel, a Dutch engineer, born in Holland in 1572, made actual application of Bourne's ideas, and constructed a submersible boat in 1624. He tested it in 15 feet of water in the Thames at London, during one of which tests it is reported that he had King James I. as a passenger. Apparently he attempted propulsion by means of oars that passed through the boat's sides, the apertures being covered by leather pockets attached to oars and boat. What plan he had for keeping the boat's air respirable when submerged is not clear, though there are some fantastic but not authenticated claims that he used a chemical compound for refreshing it. If he really plunged, which is by no means certain, it was probably for only a few minutes at a time.

In 1634, the same year in which Van Drebbel died in London, there was published a book entitled, "Hydraulica Pneumatica," containing a chapter "De nauibus sub aqua natantibus." This interesting work was written by a noted French theologian and philosopher, Marin Mercenne (1588–1648), a member of the order of Minimes Fathers. As was frequently done at that period in the case of technical treatises, Father Mersenne wrote his book in Latin, and gave his name the latinized form of Mercennus. He describes Drebbel's boat, but credits Bourne with having first proposed the principles that Drebbel used, and recalled that Bourne had suggested the possibility of getting fresh air through tubes reaching to the surface. Mercenne's contribution to the art was his stated belief that the compass would be equally efficient beneath as well as on the surface.

In 1653, a French engineer, de Son, constructed in Holland a curious boat, 72 feet long, propelled by a hand-driven wheel. This boat was hardly a submarine as it


Wahrhaffte abbildung deß Wunderbahren Schiffs, so zu Rotterdam Anno 1653
gemacht worden.
1 Der Balcken womit die Krafft des Schiffs
wird gethan werden anbeeden E dan ebenglech 5
2 Das Schiff welch durch den
hinte[r] [illegible] Balcken gezogen wird.
3 Der Krutbalcken an vnder Platz wie oben.
4 Die 2 Ende des Schiffs womit die Krafft
Wirt gethan werden mit Eysernebander Schlage. 8
D[e] Eysernebänder mit Schrauben. 9
Wie Troff das Schiff in das wasser gehet bis
an den mittel Balck 10.
Durch gehende Spindell da das Rathauff
drahet, welches den Fortganck machet. 11.
Zween Backen oder Lufft löcher.
Gallery darauff [illegible] oben in vnd hergehen kan.
Das Inwendige [illegible]
Dieß Blattlen [illegible] gelembd oben an die Gallery
vnd deckt das Rath zu wie das Schiff ganz sein muß.
Das Schiff ist 72 Schuh lang, 12 hoch vnd 8. Schuh breit.

DE SON'S UNDERWATER BOAT, 1653

was not expected to submerge completely. It is interesting as the first application of a mechanical motive force other than oars and the first suggestion of a paddle wheel. It, therefore, marked a great step forward in matters of design. A translation of de Son's modest description of this boat as shown on the bottom of the design is as follows:

ACCURATE REPRESENTATION OF THE NEW WONDERFUL SHIP MADE AT ROTTERDAM.

As Mons. Duson has been greatly disappointed at the presentment of his ship, which was in all ways greatly misrepresented, both as regards the rudder, the paddle wheel, and the whole disposition of the vessel when published at Amsterdam, we think it useful to give an exact representation of the ship (as above depicted) and the reader will at once see the difference. The Inventor will undertake to destroy with the ship in one day a fleet of a hundred vessels. No fire, no cannon ball or rocket, no storm or waves can hinder him unless God the Lord should intend to do so. Even if the ships which lie in the harbors consider themselves safe, he will run them to the bottom and turn around just as easily as a bird in the sky so that no one can hurt him, and should his ship be taken by treason, for otherwise it is quite impossible, it could not be governed by any one else but him. He will be able to make in one hour at least ten miles, and should he run on a bank his vessel will swim as light on the water as a light sloop would do. He believes he will be able to go with this vessel in ten weeks to and from the East Indies, and in one day to and from France, so that it may be called the greatest wonder of the world.

The next contributor was an Englishman, John Wilkins, Bishop of Chester. Wilkins was an exceedingly interesting character and deserves to be remembered not only for what he did to advance the art of submarine design, but for what he was and what he accomplished in many ways. His life is set forth in considerable detail in the preface of the fifth edition of his principal scientific production, "Mathematical

Magick: or the Wonders that may be perform'd by Mechanical Geometry," this particular edition being published posthumously in 1707.

From this sketch it appears that he was born in 1614. It is stated that at school his proficiency was such that he entered New Inn, Oxford, when 13 years old. After graduation, not at New Inn but at Magdalen Hall, he took orders and served as Chaplain, first to Lord Say and then to Charles, Count Palatine of the Rhine. On the outbreak of the English civil war, he joined the parliamentary party. In 1648, he received the degree of Doctor of Divinity, and in 1656, married the sister of Oliver Cromwell, then Lord Protector. Soon after he was appointed head of Trinity College, Cambridge. Charles II, on his restoration to power, removed Dr. Wilkins from his position at Cambridge, though subsequently gave him preferment, first, by making him Dean of Ripon, and soon after, Bishop of Chester. Apparently Wilkins had made it clear to the royalist party that he could serve quite as well under their standard as under that of his late brother-in-law.

In the short interim while out of royal favor he resided in London, where he was elected to the Royal Society and a member of its Council. It will thus be seen that Wilkins was no narrow-minded person. He could adapt himself to whatever political party was in power, and apparently he could do equally well as an educator, theologian and man of science. At any rate, of his varied abilities, his excellence in these three was recognized by his contemporaries who conferred on him the highest honors in each of the three fields. He did not however restrict himself to those labors, but was also an author of no small productivity. Among his writings are:

1. "The Discovery of a New World; or, a Discourse tending to prove that ('tis probable) there may be another Habitable World in the Moon." 1638.

2. " Discourse concerning the Possibility of a Passage to the World in the Moon." 1638.

3. " Discourse concerning a New Planet; tending to prove, that ('tis probable) our Earth is one of the Planets." 1640.

4. " Mercury; the Secret Messenger: Shewing how a Man may with Privacy and Speed communicate his thouhts to his friend at any Distance." 1641.

5. " Mathematical Magick; or, The Wonders that may be perform'd by Mechanical Geometry." 1648.

6. " An Essay towards a Real Character, and a Philosophical Language " including, " An Alphabetical Dictionary." 1668.

7. Several works on theological subjects.

The above books seem to have won popular approval because they appear in several editions. Bishop Wilkins died in 1672 after a life full of strenuosity, variety and action.

It is with his scientific publication standing fifth in the above list that we are specially interested. This little book, which treats of a great number of mechanical devices and principles such as wheels, pulleys, screws, engines of war, clocks and other similar machines, contains two chapters, one entitled, " Concerning the Art of Flying. The several ways whereby this hath been, or may be attempted " ; and the other, " Concerning the Possibility of framing an Ark for Submarine Navigation. The Difficulties and Conveniences of such a Contrivance." The latter chapter is the one that bears on our present discussion.

Although Wilkins gives credit to Mercennus, who as he puts it, " doth so largely and pleasantly descant upon the making of a ship wherein men may safely swim under the Water," nevertheless he follows the line of thought of Bourne without giving him credit. He closely imitated Bourne's scheme of leather attachments. He suggested leather bags open at both ends, one end being without and the other within the ship, the ends capable of being closed like those of a purse. These

bags he would use as means of ingress and egress for men and materials. Motion he proposed to obtain by means of oars whose blades would be collapsible on the back stroke, the oars projecting through the ship's sides, the holes being closed with leather attached to the oars and vessel. Wilkins had in mind the use of such a vessel in attack against a " Navy of Enemies, who by this means may be undermined in the water and blown up."

The submersible power Wilkins would obtain by having his boat or " Ark " ballasted so as to be of " equal weight with the like magnitude of water," that is, to be at the critical point between floating and sinking, obviously one of greatest danger. He fancied that he could then obtain vertical motion or plunging by attaching a great weight to the bottom of the ship, to be computed, of course, as part of the ballast. If the weight were lowered by means of a cord, so would the boat ascend, and if the weight were raised, it would descend. The method of supplying air to the submerged crew was equally amusing. He depended upon the ability of men to live in a polluted atmosphere by continued practice, or if that were found impossible, the air might be purified by what he calls " refrigeration," that is, by heating it by lamps and allowing it to cool on coming in contact with the sides of the vessel, the process being assisted by bellows. It is hoped that the theology of the undoubtedly worthy bishop was sounder than his science, and that it emulated rather the particularly high scale of wisdom of his political adaptability. But no matter how ridiculous his details, he, nevertheless, left the main idea more firmly implanted in men's minds.

The above references are not a complete résumé of the early development of the underlying principles of the art of submarine navigation. They are nothing more than a brief recital of the salient and outstanding

features that mark the path of progress like milestones along a road.

With these and other similar impracticable conceptions, the art of submarine construction was found by an American, David Bushnell, born at Saybrook, Connecticut, in 1742, and graduated from Yale in 1775. In the war with Great Britain, which broke out shortly after his graduation, Bushnell conceived the idea of attacking the enemy's ships under water and there is no doubt that he constructed a boat embodying among other novel devices a screw propeller. His boat, a small affair carrying but a single operator, was scarcely a submarine as it was not intended to plunge, but to float just "awash" or almost submerged. Like Rumsey and Fitch, Bushnell went abroad and, as Fulton did later, opened negotiations with the French Government. Delpeuch says, "Then (1797) there appeared an engineer who offered to the Directory a means quite as terrible as it was invisible to force the British to lift their blockade, and not only did this man undertake to drive the enemy from our shores, but he even proposed to carry the war to the shores and ports of Great Britain, heretofore inviolable."

Fulton undoubtedly became acquainted with Bushnell during the time they were both in France engaged in similar pursuits. But the failure to accomplish results or to get his ideas adopted by others disappointed Bushnell so keenly that he returned to his native country, went to Georgia, adopted the name of Bush, and began the practice of medicine. He died in 1826, at the age of 84, when his will disclosed his identity.

## Chapter III

# FULTON'S FIRST SUBMARINE

Fulton begins work on a submarine (1797). Nautilus launched at Rouen (1800). Havre experiments. Fulton aided by Monge and Laplace. Received in audience by Napoleon Bonaparte. Hopes and disappointments.

The previous chapter shows that not only was the principle of a submarine boat not novel when Fulton began his work on it, but that according to the record a competitor was actually in France urging upon the French Government the adoption of a design that, unlike the fantastic conceptions of Bourne and Drebbel, was capable of being moved by an invisible power and of making an attack beneath the surface. But if Fulton lacked initial originality he achieved practical success in his subsequent labors by greatly improving the plans of his predecessors, as he later did in the case of the steamboat.

At first his work on a design for a submarine was merely incidental and secondary to his more cherished ambition to become a great constructor of canals. It was soon after his arrival in France that the idea of an underwater boat occurred to him, and this several years before mechanical operation of boats obtained the supremacy in his mind over small canals. His first move was apparently on the 24 Frimaire an VI (13 December, 1797) when he wrote to the Directory, "having in view the great importance of lessening the power of the English fleet, that he had a project for the construction of a mechanical Nautilus." It is interesting to note that this letter was written but six months

after his arrival in France, and in the same year that Delpeuch records Bushnell as having laid his own plan before the Directory. It is difficult to repress the thought that the latter's efforts roused Fulton to action, even if they did not suggest to him the initial thought.

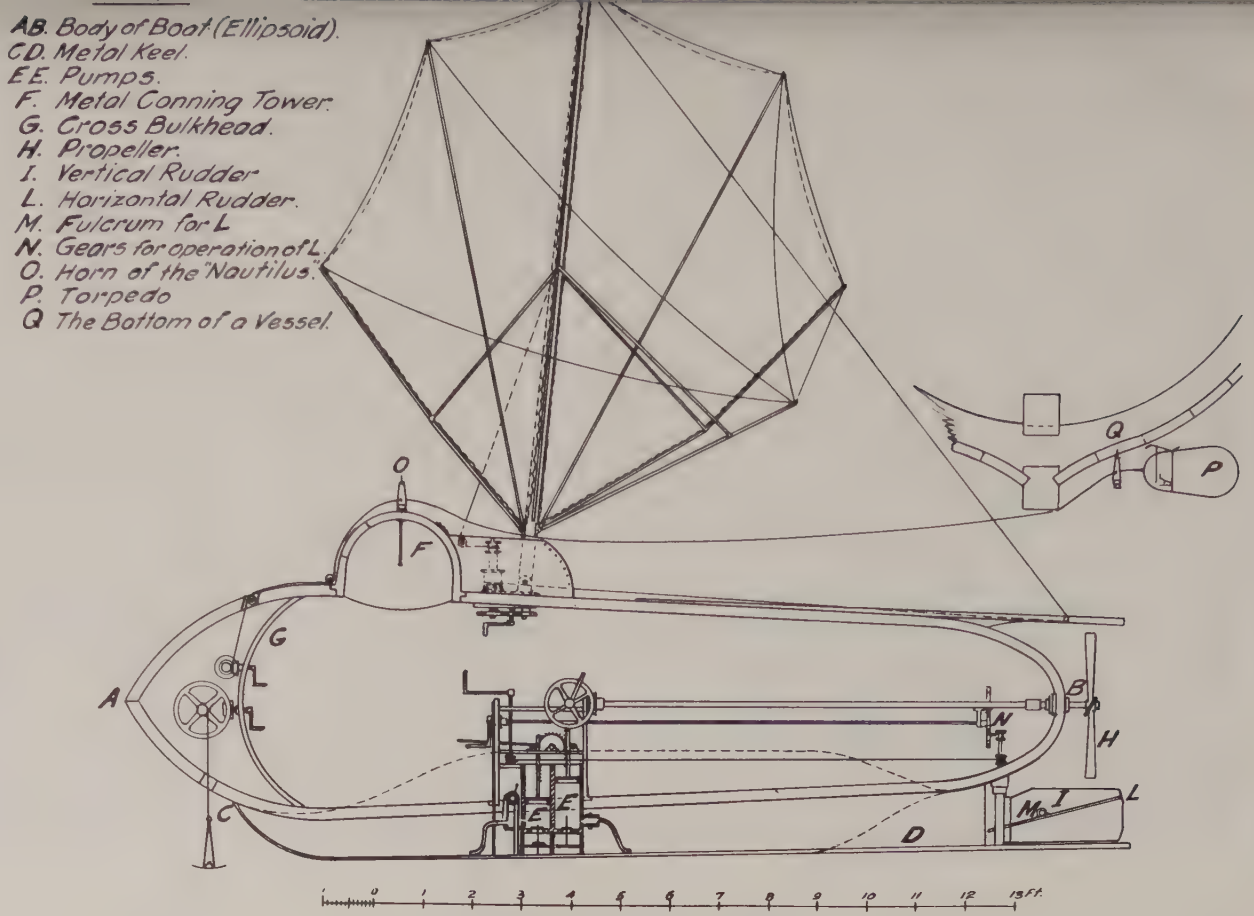
On the 2nd January, 1798, Fulton made definite proposals to the Minister of Marine, among the terms being a request that rank in the French navy be conferred at least on him, if not on all the members of the crews of the submarines, because otherwise he feared the British would treat him as a pirate. On February 12, 1798, Fulton was informed that his proposals had been declined.

Unlike Bushnell, who under similar circumstances went home discouraged and hid himself under an assumed name, Fulton prepared to renew the attack. Waiting until another Minister of Marine had been appointed, he submitted new proposals, under date of 5 Thermidor an VI (23 July 1798), concluding the offer by pointing out that the destruction of the English navy would assure the freedom of the seas and the nation which had the most natural resources — France — would alone hold, and without rival, the balance of power in Europe. The Minister convened a board of technical men to whom Fulton submitted his plans for a submarine that he called the " Nautilus." This boat had the shape of an imperfect ellipsoid, with an over-all length of 6m. 48 (21 ft. 3 in.) and extreme beam 1 m. 94 (6 ft. 4 in.). Beneath the ellipsoid there was a hollow iron keel 0 m. 52 (1 ft. 8 in.) in height, running to within 1 m. from the bow. The keel contained a quantity of ballast so that the difference between the weight of the flotation and that of the water displaced by it should be only about 4 to 5 kilograms. The only communication with the interior of the keel lay in the two parts of a suction and force pump which by means of a hand crank would

permit the introduction into or removal of water from the metal keel at will. The excess in buoyancy of the Nautilus being small, the introduction of only a little water would make it sink, and conversely, the expulsion of a small quantity would cause it to return to the surface. On the forward and top part of the Nautilus there was a spherical dome pierced with port holes covered by thick glass for observation and a man-hole that served as means of ingress and egress for the crew.

For propulsion, Fulton proposed a screw as Bushnell had already done, a principle that was not to be adopted in general practice until nearly half a century later in spite of its many and great advantages over side wheels. The screw was placed at the stern and directly ahead of the rudder and was operated by a hand crank and gearing turning a shaft passing through a stuffing box. The crank was to be turned by man power only. Plunging was to be secured by pumping water into the keel, while submersion at a given depth, provided the boat was in motion, was to be attempted by means of two inclined planes attached to the sides of the steering rudder. The angle of these planes could be altered from within, thus giving an upward or downward direction to the boat. Motion on the surface he thought to obtain by a fan-shaped sail which, with the supporting mast, could be folded down to the deck and then, preparatory to submersion, covered with envelopes like the wings of a fly. Fulton estimated that he could work the boat with a crew of three men.

The offensive feature of the design consisted first of a vertical spike attached to the top of the observer's dome. In the spike was an eye through which passed a cord leading through a stuffing box to a winding spool in the forward end of the boat. The second part was a torpedo attached to the other end of the cord. In action the Nautilus would be placed directly beneath




FULTON'S "NAUTILUS," 1798

the hull of an enemy vessel, the spike being in contact with the bottom planking. As one end of the spike projected into the observer's dome, a blow on that end would drive the upper end, which was sharp and detachable, into the ship's timbers. Then the Nautilus was to move forward leaving the spike sticking in the ship. As she moved forward, the torpedo would trail behind, but as the cord passed through the eye in the spike, the torpedo would soon be brought into contact with the hull, when the shock would fire the discharge. In the meanwhile, enough cord would have been paid out to permit the Nautilus to have attained a safe distance.

The Commission to whom the design was submitted found in its favor, except as to the sail arrangement, which they pointed out had the larger part of its area too far aloft, and that consequently the boat would lack stability under a strong wind. A translation of the Commission's conclusion is as follows:

> The Minister of the Marine and Colonies is therefore requested to give to Citizen Fulton the authorization and necessary means to construct the machine of which he has submitted a model. There is no doubt that with the same wisdom that has been put into its conception, and the refinement and solidity of the various mechanisms comprising the whole, that he who has supervised the execution of this interesting model will be able to construct the full sized machine in a manner equally ingenious and that the new ideas that he will have obtained from study and experience will but lead to its perfecting.

Though the design of the Nautilus fell far short of that of a modern submarine, nevertheless, it was so far ahead of anything previously accomplished or suggested that it entitles Fulton to be credited with being the first to propose a type of vessel capable of plunging and being navigated beneath the surface of the water. That his plans gave promise of this accomplishment was recognized by the examining commission in their

report, a report that gave Fulton great encouragement for further action. Delpeuch in his book on submarines states that in consequence of this favorable official approval:

Fulton submitted to the Minister on the 27 Vendemiaire an VI (October 17, 1798) a new project of the Company which was similar to those previously proposed except in the following articles:

1. That the Government should pay immediately on the receipt of news of the destruction of an English ship of the line, 500,000 francs, with which sum he engaged to build a squadron of 10 Nautilus to be used against the English fleets.

2. That the Government was to pay him or his assigns the sum of 100 francs for each pound of calibre of the guns of English ships destroyed or put out of action by the Nautilus during the war, that is to say, for a 5 pounder gun 500 francs, or for a 10 pounder, 1000 francs.

In spite of the favorable report by the investigating Commission and of the financial terms offered by Fulton, which were certainly liberal as they were entirely contingent on success, Fulton's proposals were again rejected.

He then went to Holland, but obtained no more encouragement from the Dutch Government than from the French. Hearing that Bonaparte had been named First Consul, he hurriedly returned to Paris. On the 13 Vendemiaire, an XI (October 6, 1800), he wrote to the Minister of Marine again proposing the consideration of the Nautilus. Attached to this letter was a memorial entitled, " Observations sur les Effets Moreaux du Nautile." This memorial was written in French, and is preserved in the Archives Nationales and is quoted at length by E. L. Pesce in " Navigation Sous-Marine." The plaint as to delay with which he began he repeated in varying form until finally in 1806, he abandoned all European negotiations and returned to America. The portion of the memorial that gives his

political reasoning is at the present time the most interesting, especially as the German Admiralty held almost precisely the same views with respect to the effect that submarines would have on the British Empire during the recent war. Fulton's severe restrictions on the British navy and his lauding of the submarine as an instrument for true " liberty and peace " sound much like communiqués emanating from Berlin during 1914–1918. As we will see, Fulton recognized later that his description of the criminal character of the British was at least inaccurate when in very similar language he pointed out how it could and should destroy the naval power of France.

The Memorial reads in part as follows:[1]

Citizen Minister

It is now twenty months since I presented for the first time the plan for my Nautilus to ex-Director La Reveillere Lepaux. He presented it to the Directory who ordered that it be forwarded to Minister of Marine Pléville, and finally it was turned down after five months of discussion.

Taken up again under the administration of Citizen Bruix, it had the same fate after about four months of waiting. A reception so little favorable on the part of the first magistrates of France, whose duty it is to encourage discoveries tending to spread liberty and to establish harmony among nations,

[1] Citoyen Ministre

Il y a maintenant vingt mois que je présentai pour la première fois le plan de mon Nautile à l'Ex-Directeur La Reveillere Lepaux; il le présenta au Dirèctoire qui eu ordonna le renvoi au Ministre de la Marine Pléville, et enfin il fut rejeté après cinq mois de discussions. Reproduit sous l'administration du citoyen Bruix, il eut le même sort après environ quatre mois d'attente, un accueil si peu favorable de la part des premiers magistrats de la France, dont le devoir est d'encourager les découvertes tendantes à propager la Liberté et à établir l'harmonie entre les nations, me prouve qu'ils s'étaient fait une idée fausee des effets tant phisiques que moraux de cette Machine.

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Voyons d'abord quels seraient pour la France les effets immédiats du Nautile. La perte du premier Bâtiment anglais qui serait détruit par un moyen extraordinaire, jeterroit le Gouvernement Britannique dans le dernier

proves to me that it was considered with a false idea of the physical as well as the moral effects of this machine.

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Let us see first what would be for France the immediate effects of the Nautilus. The loss of the first English ship destroyed by extraordinary means would throw the English Government into utter embarrassment. It would realize that its whole navy could be destroyed by the same means, and by the same means it would be possible to blockade the Thames and to cut off the whole commerce of London. Under such circumstances what would the consternation be in England? How would Pitt then be able to support the allied powers? The result would be that deprived of Pitt's guineas, the coalition would vanish and France thus delivered from its numerous enemies would be able to work without obstacle for the strengthening of its liberty and for peace.

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After having thus shown the happy effects that would follow immediately a success by the Nautilus, I pass to the objections, quite as commonplace as they are lacking in philosophy, that have been raised against this machine. I will show below

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embarras; il sentiroit que par le même moyen on pourroit détruire toute sa marine; que par le même moyen il seroit possible de bloquer la Tamise et de couper tout le commerce de Londres. Quelle seroit, dans de pareilles circonstances, la consternation de l'Angleterre? Comment Pitt soudoyeroit-il alors les puissances coalisées? It en résulteroit que, privée des guinées de Pitt, la Coalition s'evanouiroit, et que la France, ainsi delivrée de ses nombreux ennemis, pourrait travailler sans obstacle a l'affermissem[t] de sa liberté et à la paix.

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Après avoir ainsi montré les heureux effets qui résulteroient immédiatement du succès du Nautile, je passe aux objections aussi vulgaires que peu philosophiques, élevées contre cette machine. Je ferai voir ensuite comment le Nautile peut contribuer à propager la véritable Liberté et à établir l'harmonie entre les peuples.

La première objection est que si la France se servoit du Nautile contre l'Angleterre, l'Angleterre pourroit également eu faire usage contre la France; mais il ne me paroit nullement vraisemblable que les Anglais s'en servent contre

how the Nautilus can further real liberty and establish harmony among peoples.

The first objection is that if France should make use of the Nautilus against England, England would be equally able to make use of it against France. But it does not seem to me any way likely that the English would make use of it against France because before they could become acquainted with the mechanism, France would be able to blockade the Thames and cut off commerce from London and thus reduce the cabinet of St. James to terms of the most complete submission.

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la France, car avant qu'ils en connussent la mécanique, la France pourroit, comme je l'ai dit, bloquer la Tamise, couper le commerce de Londres et réduire par là le cabinet de St. James aux termes de la plus entière soumission;

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C'est la force navale de l'Angleterre qui est la source des horreurs incalculables qui se commettent journellement; c'est la marine anglaise qui soutient le gouvernement anglais, et c'est ce gouvernement qui, par ces intrigues, a été la cause des deux tiers des crimes qui ont signalé le cours de la revolution.

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Si par le moyen du Nautile on réussissoit à detruire la marine anglaise, on pourroit, avec une flotte de Nautiles, bloquer la Tamise, jusqu'à ce que l'Angleterre fut républicanisée; bientôt l'Irelande secoueroit le joug et la monarchie anglaise seroit anéantie. Une nation riche et industrieuse viendroit ainsi augumenter le nombre des républiques de l'Europe, et ce seroit avoir fait un pas immense vers la liberté et la paix universelle.

Si l'Angleterre adoptait le gouvernement républicain, je ne doute pas que la France et elle n'ensevelissent dans l'oubli ces vieilles haines et cette fatale rivalité fomentées par la stupide aristocratie. Les deux Républiques se traiteroient en soeurs, donneroient à leur commerce respectif une entière liberté et, dans ce cas, n'auroient besoin, ni l'une ni l'autre de marine militaire; ainsi l'amitié, malgré le préjugé vulgaire, uniroit deux grands peuples, et l'humanité respireroit.

De légères circonstances produisent souvent de grands changemens dans les opérations des hommes. La Boussole a donné au commerce une extension sans bornes et a multiplié les lumières; l'invention de la poudre a changé tout l'art de la guerre, sans en dimineur les horreurs. J'espère que le Nautile non seulement détruira les marines militaires, mais en brisant ces instrumens destructeurs dans les mains de l'aristocratie, servira la cause de la liberté et de la paix. Je vous ai présenté ici, d'une maniere claire et impartiale une partie de ses heureux effets, et je suis loin de me faire aucun merité de l'avoir imaginé le premièr. L'idée pouvoit en venir à tout autre ingenieur qui cherche avec autant d'ardeur que moi à faire triompher la cause de l'humanité.

It is the naval force of England that is the source of all the incalculable horrors that are committed daily. It is the English navy which supports the English Government, and it is that Government which by its intrigues has been the cause of two-thirds of the crimes that have marked the course of the revolution.

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If by means of the Nautilus one could succeed in destroying the English navy, it would be possible with a fleet of Nautilus to blockade the Thames to the end that England would become a republic. Soon Ireland would throw off the yoke and the English monarchy would be wiped out. A rich and industrious nation would then increase the number of republics of Europe and this would be a long step toward liberty and universal peace.

If England should adopt a republican government, I do not doubt that France and she would bury in oblivion the old hates and that fatal rivalry fomented by the stupid aristocracy, and the two republics would treat each other as sisters and would give to their respective commerce complete freedom, and in this case neither one nor the other would have need of a military marine. Then friendship in spite of common opinion would unite these two great peoples and humanity would breathe freely.

Small circumstances often produce changes in the affairs of men. The mariners' compass has given to commerce an extension without limits and has multiplied its knowledge. The invention of gunpowder has changed the whole art of war without diminishing its horrors. I hope that the Nautilus will not only destroy military marines, but in breaking these destructive instruments in the hands of the aristocracy will serve the cause of liberty and peace.

I have laid before you in a clear and impartial manner a part of its happy effects and I am far from assuming any merit of having imagined the first thought. The idea could have come to any other engineer seeking with the same ardor that I have to make the cause of humanity triumph.

At last success seemed to be in sight. Official lethargy and resistance were overcome and permission was given

Fulton to build a Nautilus at Rouen, which he at once commenced doing in the boat yard of the firm of Perrier. From his model he made one important change, the addition of a deck about 6 feet wide and 20 feet long, enabling the crew to come out of the hull when not submerged.

On July 24, 1800, the Nautilus was launched, and on July 29, she made her first plunge in 25 feet of water. The first submersion lasted 5 minutes, and the second, 17 minutes, the personnel consisting of Fulton and two companions. The swift river current interfered with the manipulation of the boat to such an extent that Fulton decided to make further tests in still, open water at Havre.

Under date of 19th November, 1800, he wrote a long letter to Messrs. Monge and Laplace giving an account of results obtained. These gentlemen appear to have been his loyal and enthusiastic friends through all his efforts. When others failed, or his propositions were refused by the authorities, they continued to support him, and were always ready to undertake to obtain a new hearing.

Gaspard Monge, born 1746, died 1818, was a well-known mathematician, particularly celebrated in the field of descriptive geometry. He was an ardent revolutionist, serving as Minister of Marine during 1792–3. When Bonaparte came into power, Monge espoused his cause and accompanied him to Italy.

Pierre Simon Laplace, afterward Marquis de Laplace, was even more illustrious, being a mathematician and astronomer of the highest distinction. His " Mécanique Céleste " whose exposition of the nebular hypothesis gives it permanent rank among the masterpieces of scientific reasoning, secured for its author the proud position of President of the French Academy. Like Monge he was a republican, and allied himself to Bona-

parte immediately on the latter becoming First Consul, although in 1814, he voted for Napoleon's dethronement. At the time Fulton could have found no better supporters than these two men of science, especially as both enjoyed the personal friendship of Bonaparte.

From the above mentioned letter it appears that while at Havre he carried the same crew as at Rouen, he now had a lighted candle. On his early experiment he plunged in darkness fearful that a light might seriously vitiate the air. He now remained submerged in one test six hours without inconvenience, during which time he obtained some air through a tube with the open end supported by a surface float that could not be seen at a distance of 200 fathoms. While trying relative speeds produced by two men rowing as against two men working the screw, the former made the boat cover 60 fathoms in 7 minutes, while the latter propelled it the same distance in 4 minutes. He reported that the Archimedes screw and the horizontal rudder for depth control did not satisfy him in point of efficiency. The Bushnell screw was literally a full screw with several turns as proposed by Archimedes twenty centuries earlier to raise water. When Fulton found that a full screw was not efficient, he proposed to replace it with separate blades set at an angle similar to the sails of a windmill. To this arrangement he gave the name of "Flier." The error of trying to use a full screw in propeller design persisted for more than forty years after Fulton had appreciated the lack of efficiency. Other engineers for nearly two generations ignored Fulton's experience and decision.

He then returned to Paris and elated by the success of his experiments, which certainly justified elation, he again drew up new proposals in which he offered to accept whatever remuneration the government would give, so great was his confidence. These proposals his

friend Monge laid before the First Consul with whom Monge was on terms of intimacy and whose interest Fulton had so long desired to obtain. The First Consul forwarded Fulton's letter to the Minister of Marine on 27 November, 1800, with the following marginal note:

> Je prie le Ministre de la Marine de me faire connaître ce qu'il sait sur les projets du capitaine Fulton.
>
> BONAPARTE.

A few days later Monge and Laplace presented Fulton to Napoleon Bonaparte, First Consul, urging the latter to make an allowance of 60,000 francs for further experiments.

What a dramatic moment when the two men of science presented the young American to the still younger Frenchman! A moment heavy with destiny, because the fates of nations were trembling in the balance, awaiting the decision. But no one of the four understood the importance of the conference, not even he who had most at stake. The central figure was the young Corsican artillery officer whose guns had swept the remnants of the French Revolution from the streets of Paris only five years before, then a man almost unknown, but now First Consul and Dictator of France. The successes of Lodi, the Pyramids and Marengo were still fresh in his mind and were beckoning him on to other conquests. Almost within his grasp was the crown of empire, plans to seize which he was even then maturing. In his eyes there stretched before him a path through conquest and glory, — but leading where? As he then saw the path in his imagination it led to absolute world domination with the great and little powers of Europe vassals of France.

The beginning of the path as he saw it with all its magnificence he had already found. It lay over the glittering heights of Austerlitz, Jena, Friedland and

Wagram. Across it there was only one obstacle to prevent his reaching the culmination of his ambition, and that obstacle was England's navy. Unless that could be removed, he would be forced to turn from the path over the heights and pass down into the valley of Borodino, Leipzig and Waterloo to the island prison of St. Helena. In boundless confidence in his destiny and in his own power to control it, he saw not the obstacle; or if he did, there was no doubt in his mind that he himself could remove it. Already he was all powerful on land, and he dreamed of being all powerful on sea.

It is not difficult to picture the dictator, supreme in his arrogance, facing the American, who was actually offering him the only chance there was to surmount the obstacle. Bonaparte had already learned who he was, a foreigner with few friends and no money, an unsuccessful artist in England, and an engineer in France without practise, a dreamer and inventor. Hardly the type of man to appeal to one who had already resolved to be an Emperor.

With what means did this inventor propose to attack those great masses of oak with their towering sides, with row on row of guns and great spreads of canvas? A tiny boat propelled by two men by hand, that would meet the enemy, not as Bonaparte would meet him by an attack in force, but by stealth, unseen and beneath the surface of the sea! As Bonaparte looked at his visitor he could not see the valley of Waterloo and St. Helena. Nor could he possibly imagine that long before that fateful June day of 1815, when the silence of the guns on the slope of Mt. St. Jean would mark the end of his career, the man who had been rash enough to seek the audience would have given to the world a vessel whose motive power would defy that of wind and that he would have designed a ship of war more powerful than any ship that sailed under the command of Nelson.

The tiny boat that was offered him was far from being a perfected machine, but even as it was it presented sufficient potentiality to strike terror to England's navy as Fulton had prophesied in his Memorial. If Livingston with such limited means as he possessed could develop Fulton's ideas into practical reality, how much sooner could the same result have been attained through the resources of a great government?

Fulton offered to Bonaparte world dominion.

Bonaparte listened and took the offer under consideration.

While waiting Bonaparte's answer and apparently while Admiral Decrès, Minister of Marine, still had the matter under investigation in accordance with Bonaparte's instructions, Fulton wrote the Minister under date of 3rd December, 1800, saying among other things:[1]

> You will permit me to observe that although I have the highest respect for you and the other members of the Government, and although I retain the most ardent desire to see the English Government beaten, nevertheless the cold and discouraging manner with which all my exertions have been treated during the past three years will compel me to abandon the enterprise in France if I am not received in a more friendly and liberal manner.

It is interesting to note that this is the only letter in French that has been found in the government archives written wholly in the handwriting of Fulton himself. The other letters in the possession of the French Government that are written in French were written by his secretary and signed by him.

Fulton's wise and diplomatic friends, Barlow, Monge

[1] Vous me permettrez d'observer, que quoique j'ai le plus haut respect pour vous et les autres membres du gouvernement, et quoique je conserve le plus ardent désir de voir abattre la marine Anglaise, cependant la maniere froide et décourageante dans laquelle toutes mes exertions ont été traitées depuis trois ans, me forcent à abandonner l'enterprise en France, si on ne l'accueille pas d'une maniere plus amicale et libérale.

and Laplace, must have been absent when the above tactless lines were penned. That they were the actual handwork of Fulton himself would seem to indicate that he was actuated by a momentary burst of impatience, and that in his haste to give vent to his feelings, he did not wait for his secretary to write the letter in French. What was in consequence almost inevitable, happened. Admiral Decrès, as Minister of Marine, reported adversely on Fulton's plans. Fulton's letter, of course, had not served to overcome the settled objection of a sailor to mechanical innovation.

## Chapter IV

## NEGOTIATIONS WITH FRANCE

Nautilus reconstructed and tested at Brest (1801). Reports to Monge, Laplace and Volney. Great expectations. Final rejection (1802). Partnership with Robert R. Livingston. Work begun on steamboat. British Admiralty aware of his submarine accomplishment. Induced to return to England (May, 1804).

The always faithful Monge and Laplace came once more to the aid of their temperamental friend. They personally intervened with the First Consul, and actually succeeded in persuading him to authorize the reconstruction of the Nautilus in spite of the adverse professional opinion of the Minister. He appointed a new commission to investigate, naming MM. Monge, Laplace and Volney. The last, unlike the first two, was not a scientist. He was an eminent scholar, a great traveller and member of the Institute. He had visited the United States five years previously and had written a book on its climate and soil. He narrowly escaped the guillotine, was created a count under the Empire, and a peer of France after the restoration. He died in 1820.

With the encouragement induced by the naming of this friendly commission, Fulton at once began his task. The Nautilus was transported from Havre to Brest and there refitted with the alterations and improvements that occurred to Fulton as the result of the Havre experiments. On July 3rd, 1801, he made his first plunge at Brest in his improved boat. This time he was accompanied by three men instead of two as on the previous occasions.

An account of what he did at Brest is preserved in a manuscript copy of a report that he made to the commissioners. This report was published by Mrs. Sutcliffe in her book on the "Clermont," but it is so graphic that with Mrs. Sutcliffe's consent it is reprinted in full exactly as Fulton wrote it:

Paris 22d, fructidore An 9

Robert Fulton to the citizens Monge, La Place and Volney, members of the National Institute, and Commissioners appointed by the first Consul to promote the invention of Submarine Navigation —

Citizens, yesterday on my return from brest I received your note, and will with pleasure communicate to you the result of my experiments, during the summer, also the mode which I conceive the most effectual for using my invention against the enemy. Before I left Paris I informed you that my plunging boat had many imperfections, natural to the first machine of so difficult a combination, added to this I found she had been much injured by the rust during the winter in consequence of having in many places used Iron bolts and arbours instead of copper or brass, the reperation of those defects and the difficulty of finding workmen consumed near two months And although the machine remained still extremely imperfect yet she has answered to prove every necessary experiment In the most satisfactory manner.

On the 3d of thermidor I commenced my experiments by plunging to the depth of 5 then 10 then 15 and so on to 25 feet but not to a greater depth than 25 feet as I did not conceive the Machine Sufficiently Strong to bear the Pressure of a Greater column of water, At this depth I remained one hour with my three companions and two candles burning without experiancing the least inconvenience.

Previous to my leaving Paris I gave to the Cn. Gueyton member of the Institute a calculation on the number of cube feet In my boat which is about 212 in Such a Volume of Air he calculated there would be sufficient Oxszine to nourish 4 Men and two small candles 3 hours. Seeing that it would be of great Improvement to despence with the candles I have constructed a Small window in the upper part of the Boat near the bow which window Is only one inch and a half diameter

and of Glass 9 lines thick, with this prepared I descended on the 5th of thermidor to the depth of between 24 and 25 feet at which depth I had Suffecient light to count the minuets on the Watch, hence I conclude that 3 or 4 Such windows arranged in different parts of the boat would give suffecient light for any operation during the day each window may be Guarded by a Valve in Such a manner that Should the glass break the Valve would immediately Shut and Stop out the Water, finding that I had air and light Suffecient and that I could Plunge and Rise perpendicular with facility. On the 7th Ther[d] I commenced the experiments on her movements At 10 in the Morning I raised her anchor And hoisted her Sails which are the Mainsail and Gib the breeze being light I could not at the Utmost make more than about two thirds of a league per hour. I tacked and retacked tryed her before and by the wind And in all these operations found her to Answer the helm And Act like a common dul Sailing boat, After exersising thus About An hour I lowered the mast and Sails and commenced the operation of Plunging this required about two Minuets. I then placed two men at the engine which gives the Rectileniar Motion, And one At the helm, while I governed the machine which keeps her ballanced between two waters. With the bathomater before me And with one hand I found I could keep her at any depth I thought Proper the men then commenced movement and continued about 7 Minuets when mounting to the Serface I found we had gained 400 Matres. I again plunged turned her round under water and returned to near the Same place. I again plunged And tried her movements to the right and left, in all of which the helm answered And the compass acted the same as if on the serface of the Water having continued these experiments the 8, 9, 10 and 12th untill I became fameliar with the movements And confidence in their operation, I turned my thoughts to Increasing or preserving the Air, for this purpose the Cn. Gueyton advised to precipitate the carbonic acid with lime, or to take with me bottles of Oxizine which might be uncorked as need required; but as any considerable quantity of bottles would take up to much room, And as oxizine could not be created at Sea without a Chymical operation which would be Very Inconvenient, I adopted a mode which occured to me 18 months ago which is a Simple Globe or bombe of copper capable of containing one cube foot to (Manuscript is

torn here) A Pneumatick Pump by means of which Pump 200 Atmospheres or 200 cube feet of common Air may be forced Into a Bomb consequently the Bomb or reservoir will contain As much oxegine or Vital air as 200 cube feet of common respirable Air, hence if according to Cn. Gueyton's Calculation 212 feet which is the Volume of the boat will nourish 4 Men and two small candles 3 hours this additional reservoir will give Suffecient for 6 hours — this Reservoir is constructed with a measure and two cocks So as to let measures of Air Into the Boat as Need may require —

Previous to my leaving Paris I gave orders for this machine but it did not arrive till the 18 of thermidore on the 19 I ordered 2 Men to fill it which was an operation of about one hour I then put It into the boat and with my three companions but without candles plunged to the depth of about 5 feet, At the expiration of one hour and 40 Minuets I began to let off Measures of air from the reservoir and So on from time to time for 4 hours 20 Minuets without experiancing any Inconvenience —

Having thus succeeded

To Sail like a common Boat
To obtain Air And light
To Plunge and rise Perpendicelar
To turn to the right and left at pleasure
To steer by the Compass under Water
To renew the Common Volume of Air with facility

And to Augment the respirable air by a reservoir, which may be obtained at all times, I conceived every experiment of importance, to be proved in the most satisfactory manner hence I Quit the experiments on the Boat to try those of the Bomb Submarine. It is this bomb which is the Engine of destruction the Plunging boat is only for the purpose of carrying the bomb to where it may be used to Advantage. They are constructed of Copper and of different sizes to contain from 10 to 200 Pounds of powder each bomb is arranged with a Gun lock In Such a manner that if it Strikes a Vessel or the Vessel Runs against it, the explosion will take place and the bottom of the Vessel be Blown in or so Shattered as to insure her destruction. To prove this Experiment the Prefet Maritime, And Admiral Vellaret ordered a Small Sloop of About 40 feet long to be anchored in the Road, on the 23d of Thermidor

With a bomb containing about 20 Pounds of powder I advanced to within about 200 Matres then taking my direction So as to pass near the Sloop I Struck her with the bomb in my Passage the explosion took Place and the Sloop was torn into Atoms, in fact nothing was left but the buye and cable, And the concussion was so Great that a Column of Water Smoak and fibres of the Sloop was cast from 80 to 100 feet in Air, this Simple Experiment at once Proved the effect of the Bomb Submarine to the Satisfaction of all the Spectators; of this experiment you will See Admiral Villarets description in a letter to the Minister of Marine —

Having Given in a Short Sketch of the Sucession of my Experiments, the mode of using these inventions Against the enemy is now to be considered, on this Point time and experience will make numerous improvements As in all other new inventions and discover modes of operation which could not possibly accur to me; when Powder was Invented Its Infinite applications were not thought of, nor did the Inventors of the Steam Engine conceive the numerous purposes to which It could be applied, in like manner it is Impossible At present to See the Various modes, or the best methods of Using a plunging boat or the bomb Submarine —

But as far as I have Reflected on this point I conceive the best operation to be as follows —

First

To construct one or two Good Plunging Boats each 36 feet long and 12 feet wide Boats of this capacity would be Sufficient to contain 8 Men and Air for 8 hours. With Provisions for (paper is torn here) and transport from 25 to 30 Bombs at a time, their Cylenders Should be Brass and of a Strength to admit of descending 60 or 80 feet under Water in case of need And they may be Constructed to Sail from 5 to 7 Miles per hour; here it may be well too proove that Quick Sailing is not one of the most important considerations in this invention, if such a boat is Pursued, She plunges under water and as She Can remain under Water from 4 to 8 hours and Make at least one Mile Per hour She Could rise Several miles from the Place where She Plunged to renew her air, thus the enemies Ports could be approached, And particularly under the cover of the Night Nor do I at Present See that any Possible Vigil-

ence could Prevent these invisible engines entering their Ports and Returning at Pleasure —

Second

Let there also be Some hundreds of Bombs Submarine Constructed of Which there Are two Sorts one arranged with Clockwork in Such a manner as to Go off at any Given Period from 4 Minuets to 4 hours, the Other with a gun Lock as before mentioned So as to go off when it Strikes against a Vessel or when a Vessel runs Against it. Each of these carcasses is arranged So as to float from 4 to 15 feet under water in Proportion to the Water which the Vessels to be attacked Draws, And in this there are two advantages, the first is that the bomb is Invisible, the Second is that when the explosion takes place under water the Pressure of the colume of water to be removed forces the whole action of the powder Against the Vessel; it was the resistance of the water which caused the Sloop on which I proved the experiment to be reduced to Atoms; for Water when Struck Quick such as the Stroke of a cannon ball or the expansion of Powder acts like a Solid, and hence the whole force was Spent on the Sloop or rather passed through the Sloop in finding its Passage to the air by the perpendicular and Shortest line of Resistance — the Same effect would no doubt be produced on a Vessel of Any dimensions by applying a Proportionate Quantity of powder Such as 2, 3 or 4 hundred Weight,

Therefore being prepared with plunging boats and Bombs submarine let the business of the boats be to go with cargoes of bombs and let them loos withe the current into the harbours of Portsmouth, Plymouth, Torbey or elsewhere, those with their graplings floating under water could not be perceived Some would hook in the cables, bow or Stern, or touch in their Passage; many no doubt would miss but Some would hit go off and destroy the Vessels they touched, one or more Vessels Destroyed in a Port by such invisible agents would render it to dangerous to Admit of any Vessel remaining. And thus the enemy may At all times be attacked in their own Ports — and by a means at once cheap, Simple And I conceive certain in its operation. Another mode Should be to go with cargoes of Bombs and Anchor them in the entrance of rivers So as to cut off or Blockade the commerce 2 or 3 hundred for example

Anchored in the Thames or the channels leading to the Thames would completely destroy the commerce of that river and Reduce London and the Cabinet of St. Jameses to any tirms; no Pilot could Steer clear of Such hidden dangers, no one dare to raise them even if hooked by graplings as they could not tell the moment they Might touch the Secret Spring which would cause the explosion and destruction of everything Around them. No Vessel could Pass without the utmost danger of running on one of them And her instant destruction, if this measure Should ever become necessary Some Vessels Will most certainly be destroyed and their Destruction alarm the whole commerce of the Thames, by this means the Thames may be blockaded and the trade of London completely stoped nor can the combined fleets of England prevent this Kind of attack — And this is Perhaps the most Simple and certain means of convincing England that Science can put her her in the Power of France and of compelling her to become a humble Pleader for the liberty of the Seas She now denies to her Neighbors — I therefore conceive that it will be good Policy to commence as Soon as Possible the construction of the Boats and bombs if they can be finished before the arrival of Peace their effects may be Proved during this War Should Peace be concluded before they are finished the experiments can be continued Men can be exersised in the use of the engines; And it is Probable in a few years England will See it her best policy never to give france reason to exersise this invention against her — if England cannot prevent the Blockade of the Thames by the means of plunging boats and Bombs submarine, of what use will be her boasted navy, the free Navigation of the Thames nourishes the immense commerce of London And the commerce of London is the Nerves and Vitals of the Cabinet of St. Jameses — convince England that you have the means of Stopping that Source of Riches — And She must Submit to your terms —

Thus Citizens I have presented you with a Short account of my experiments and Plan for using this invention Against the enemy, hoping that under your protection it will be carried to Perfection, and Practised to promote the Liberty of the Seas —

Health and Sincere Respect

Robert Fulton

After reading the above, the commissioners desired further information which Fulton gave in the following letter:

"Complimentary day an 9
(i.e. September 20, 1801)

Robert Fulton to the Citizens Monge, La Place and Volney members of the National Institute and Commissioners appointed by the first Consul to Promote the invention of Submarine Navigation.

Citizens this morning I received yours of the 2d Comp[1] As to the expence of Plunging boat, I believe when constructed in the best manner with every improvement which experience has Pointed out She cannot cost more than 80,000 Livers, the bombs Submarine may be estimated at 80 Livers each on An Average independent of the Powder.

I am Sorry that I had not earlyer information of the Consuls desire to See the Plunging boat, when I finished my experiments. She leaked Very much and being but an imperfect engine I did not think her further useful hence I took her to Pieces, Sold her Iron work lead and Cylenders and was necessitated to break the greater part of her movements In taking them to Pieces, So that nothing now remains which can give an Idea of her Combination, but even had She been complete I do not think She could have been brought round to Paris — You will be so good as to excuse me to the Premier Consul, when I refuse to exhibit my drawings to a committee of Engineers for this I have two reasons, the first is not to put it in the Power of any one to explain the Principles or movements least she Should Pass from one to another till they enemy obtained information, the Second is that I consider this invention as my Private Property the Perfectionment of which will give to france incalculable advantages over her most Powerful and Active enemy. And which invention I conceive aught to Secure to me an ample Independence, that consequently the Government Should Stipulate certain terms with me before I proceed to further explination: the first Consul is too Just and you know me too well to construe this Into an Avericious disposition in me.

I have now laboured 3 years and at considerable expence to Prove my experiments. And I find that a man who wishes to Cultivate the useful Arts cannot make rapid Progress with-

out Sufficient funds to put his Sucession of Ideas to immediate Proof — And which Sufficiency I conceive this invention Should Secure to me, You have intimated that the movements and combination of So interesting an engine Should be confided to trusty Persons least any accident Should happen to me, this Precaution I took Previous to my departure from Paris for my last experiment by Placing correct Drawings of the machine and every improvement with their descriptions In the hands of a friend So that any engineer capable of constructing a Steam engine could make the Plunging Boat and Carcasses or Bombs. You will therefore be so good as to beg of the first consul to permit you to treat with me on this business, And on this Point I hope there will not be much difficulty

Health and Sincere respect

(Signed) Robert Fulton

From the above letter it appears that Napoleon had expressed a wish to inspect the Nautilus, which was prevented by Fulton having destroyed her immediately after the termination of the experiments. Had she been saved what an intensely interesting exhibit she would make today!

Fulton's haste in dismantling her is quite on a par with his refusal to exhibit his drawings on the ground that they were his private property. Apparently he expected the French government to adopt his ideas on his own statement of facts and unverified interpretation of his experiments. In his impetuosity and lack of judgment he could not see that he was defeating his own purposes.

The Brest experiments not only repeated the success shown at Havre, but gave evidence of improvements as was recognized by the authorities. Their attitude is perhaps shown by the Préfet Maritime at Brest who after witnessing the tests was forced to approve the Nautilus and all of Fulton's claims, but added, " This manner of making war against an enemy carries the adverse criticism that the person using the device and

sinking with it would be lost. Certainly that is not a death for military men." How little did the estimable and high-minded préfet foresee the ruthless methods of warfare to be employed in another century.

Delpeuch asks what were the reasons that prevented use being made of the Nautilus or at least from trying it, and in answering his own question says that it is a mystery that has been impossible to clear away. There was no mystery. All innovations, and perhaps particularly so in connection with ships, have been forced on the world against the opposition of those to be directly benefited. It was so with Fulton's submarine, and later with his steamboat. The change from side wheels to propellers, the use of metal for hulls, the introduction of watertight bulkheads and the elimination of sails were all adopted only after long delay and strong antagonism, due to the same official and unreasoning opposition.

Realization of defeat came slowly to Fulton, and was all the more bitter because it came so. He returned to Paris from Brest elated by his success in demonstrating the value of the improvements to his previous design. He expected to be notified immediately that his offer had been accepted. As the days passed without word from Bonaparte, certainty of victory first gave way to doubt, then doubt to hope, and finally hope was changed to despair. In his impatience he wrote a personal letter to Bonaparte. This letter dated 19 Fructidor an IX (16 Sept., 1801) urging and begging favorable action is still preserved in the Archives Nationales at Paris.

Bonaparte made no reply.

He had made up his mind to travel the road that led to St. Helena. Although he gave Fulton no answer, it is reported that he spoke of Fulton as being a charlatan and a swindler, intent only on extorting money.

There is one piece of evidence showing that Bonaparte

subsequently regretted his action and realized the value that Fulton and his inventions might have been to him. Desbrière in his book entitled "1793–1805, Projets et Tentatives de Débarquement aux Iles Britanniques," quotes a letter written on July 21st to M. de Champagny, at that time Counsellor of State in the Marine department:[1]

I have just read the proposition of Citizen Fulton that you have sent to me much too late *to permit it to change the face of the world*. However I desire that you will immediately refer its examination to a commission composed of members chosen from the different classes of the Institute. It is there that the wisdom of Europe should seek judges to solve the problem in question. As soon as the report is made it will be transmitted to you and you will send it to me. Be sure that this will not take more than a week.

Desbrière states that the year when this letter was written is commonly put down as 1804. But he points out that in July of that year Fulton was in England and Champagny in Austria. The year was probably 1803, because in July, 1803, Fulton was exhibiting a steam-propelled boat on the Seine, concerning which innovation an official of the Navy department would undoubtedly have informed the First Consul.

During the agonizing period of waiting for an answer to his personal letter to Bonaparte, from which he had the right to expect some acknowledgment at least in view of the high standing of his introducers, Fulton still hoped. But when he heard that Bonaparte had characterized him as a swindler, he knew that all was ended, and that the door to further progress in France

[1] Je viens de lire la proposition du citoyen Fulton que vous m'avez adressée beaucoup trop tard, *en ce qu'elle peut changer la face du monde*. Quoiqu'il en soit, je désire que vous en confiiez immédiatement l'examen à une commission composée de membres choisis dans les différentes classes de l'Institut. C'est là que l'Europe savante doit chercher des juges pour résoudre la question dont il s'agit. Aussitôt le rapport fait, il vous sera transmis et vous me l'enverrez. Tâchez que tout cela ne soit pas l'affaire de plus de huit jours.

had been shut and finally barred. This was something much more to Fulton than a mere refusal of an inventor's offer of an incomplete device. Such a refusal he could have endured with courage and some equanimity. He had gone through similar painful experiences with his canal schemes and his various excavating machines. Now he had to suffer that disappointment and in addition the still harder blow of having his altruistic offer of service and his views on political philosophy rejected with slanderous contempt to which he was powerless to reply. His writings show that his heart was as much set on his conception of liberty and freedom as on his mechanical contrivances.

After his defeat, one that Fulton recognized as final so far as France was concerned, he laid aside permanently his long cherished plans for constructing small canals, and temporarily his consideration of submarine warfare, to devote his attention to the development of a boat propelled by a steam engine. His only subsequent move to promote a system of canals coupled with his scheme to overcome differences in elevations by inclined planes was in a letter to Albert Gallatin, dated Washington, Dec. 8, 1807. Gallatin was then Secretary of the Treasury of the United States and was about to issue in pursuance of a resolution of the Senate a report upon "Public Roads and Canals." Fulton in his long letter, that Gallatin made a part of his report, urged the construction of canals in preference to highways. Engrossed, however, in his steamboat to which, following the rejection of the Nautilus, he had thrown his impetuous energy, Fulton made no effort personally to carry his canal plans into execution either in France or the United States.

In 1801, Robert R. Livingston had arrived in France as American Minister to the French Government. He and Fulton met at the critical period in the latter's

career. The statesman, whose mind was sympathetic to the consideration of mechanical applications, soon became interested in his countryman's projects. Stimulated by Livingston's personal encouragement and supported by his financial aid, Fulton pushed his studies of a practical steam engine for navigation and entered into correspondence with Messrs. Boulton and Watt, then the most prominent builders of engines in England. The junior member of this firm was the famous James Watt (1736–1819), the discoverer of the principle that power could be produced from the elastic energy of steam, and the inventor of the steam condensing engine. Livingston as an individual with his own limited resources was about to accomplish in a few years a complete revolution of vessel propulsion that Napoleon with the almost unlimited resources of France could have done in much less time, certainly in time to offset England's superiority on the high seas. Livingston with greater vision seized the opportunity that Napoleon rejected. But with this we are not concerned.

While Fulton was working under Livingston's direction, the British Government was not unmindful of what he had done in the matter of submarine experiments. They had a secret service at work in enemy lands as other governments have done before and since. In England there were some men in authority who appreciated the possibilities lying dormant in the scheme of under-water attack.

In the British naval archives there has recently been found the following letter with its enclosure, recording the information possessed by the government and sent confidentially to the naval commanders that they might be on their guard against attack, if, perchance, any of Fulton's boats should have been made secretly and unknown to the British navy. The British authorities did not deceive themselves, nor were they oblivious of the

latent merits and actual accomplishments of Fulton's design.

*SECRET*
CIRCULAR

Admiralty Office,
19th June, 1803.

Adml. Lord Keith
Sheerness.
Admiral Montagu/20th/
Portsmouth.
Rear Adml. Montagu
Downs.
Honbl. Adml. Cornwallis
/20th/ at Sea.
Adml. Sir Jno. Colpoys, K. B.
/20th/ Plymouth.

My Lord,

My Lords Commissioners of the Admty. having been informed that a plan has been concerted by Mr. Fulton, an American resident at Paris, under the influence of the First Consul of the French Republic, for destroying the Maritime Force of this Country; I am commanded by their Lordships to send you herewith the substance of the information they have received relative thereto, that you may be apprised thereof, in order to your taking such measures as may appear to you necessary for frustrating any attempt on the part of the Enemy, connected therewith.

I have the Honour to be,
etc.
(Signed) Evan Nepean

(ENCLOSURE)

Mr. Fulton, an American resident at Paris, has constructed a Vessel in which he has gone down to the bottom of the Water, and has remained thereunder for the space of *seven* Hours, at one time — that he has navigated the said Vessel, under water, at the rate of two Miles and an half per Hour; that the said sub-marine Vessel is uncommonly managable, and that the whole plan to be effected by means thereof, may be easily executed, and without much risk; That the Ships and Vessels in the port of London are liable to be destroyed with ease, and that the Channel of the River Thames may be ruined; and that it has been proved that only twentyfive pounds of weight of Gunpowder was sufficient to have dashed a Vessel to pieces off Brest, tho' *externally* applied.

But Fulton contributed directly to the information possessed by the British Government of what he had been doing and what he had in mind. He himself states that he wrote to his old friend the Earl of Stanhope giving him "general ideas of my plans and experiments." Stanhope became so much interested, or "alarmed," as Fulton puts it, that he made a public speech on the matter in the House of Lords. The speech by the Earl and the confidential information secured by the Admiralty led the British authorities to open communication with Fulton and finally, though without great difficulty, to induce him to go to England. They saw that it would be better to have the ingenious American a friend on their side rather than attached to the enemy's cause. But let Fulton tell this story in his own words as given in the manuscript that he left with Consul Lyman to be delivered to Mr. Barlow in the event of his being lost on the voyage home. This paper will be subsequently called the "Descriptions" as named by Fulton.

## Chapter V

# THE "DRAWINGS AND DESCRIPTIONS"

Motives for inventing submarine Navigation and attack,
Statement of the causes which brought me to England, reflections on the prospect of emolument held out to me by Lord Hawkesbury, and again under the Contract with Mr. Pitt and Lord Melville,
Statement of the Sums received and disbursed by me.

Robert Fulton

Motive for inventing Submarine Navigation and attack.

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Having contemplated the Federal government of the united States; the Vast country comprised in them which gives room for 120 Millions of inhabitents; Seeing the rapid increase of their population and consequently of their industry and commerce; A people without colonies and who did not desire to have any; Without Enemies on their frontiers, and having nothing to contend for but a rational intercourse with foreign nations by sea; which intercourse would be interrupted on every war which might take place between England and France or between European nations; and cause Vexatious feuds and parties in America, which might lead to marine and army establishments, to alliences offensive and defensive with European states, thereby direct the ambition of individuals to Military fame and the people to warlike pursuits; and all their complication of evils; which might finally divide the states, and destroy a system which should progress *as near as man is capable*, to the perfection of civilization.

I was to prevent the possibility of all such consequences; by destroying the principles which lead to them; that induced

As my right to the Salary cannot as I conceive be
questioned for I have continued on this Country to
get the decision of ministers; - and
Should the 16 thousand pounds remuneration be
admitted Government will owe me on this
Account 1,603. 3. 2. such are the sums received
by me and the Gross of their distribution. the
accounts will explain the details.

Robert Fulton

London august 10th 1806

Motives for inventing submarine Navigation
and attack,
Statement of the causes which brought me to
England, reflections on the prospect of emolument
held out to me by Lord Hawkesbury, and
Again under the contract with Mr. Pitt
and Lord Melville,
Statement of the Sums received and
disbursed by me.

Robt Fulton

MANUSCRIPT PAGES WITH FULTON'S SIGNATURE

me at first to contemplate a plan which might destroy all Military marines and give liberty to the seas; But I did not hope to neutralize military marines by a confederation of maritime states; Henry the Fourt of France, and the Abbey St. Pierre with all their influence endavoured in vain to preserve peace in Europe by a confederation of States and a congress [of st] to decide on grievances;

I therefore looked to the arts for effecient means; and after some months study found that only two things were wanting: First to navigate under water, which I soon discovered was within the limits of physics, Second to find an easy mode of destroying a ship; which after a little time I discovered might be done by the explosion of some pounds of powder under her bottom; Being convinced of the practicability of two such engines, I commenced drawings on their combinations; and calculations on their power and effects; which occupied me near nine months I then began my experiments first on a small and then on a large scale; and in two years was so wellsatisfied with my success and that everything which I had contemplated might be performed; that I wrote to the Earl of Stanhope and gave him general Ideas of my plan and experiments; His Lordships mathematical mind soon opened to him the practicability and ultimate consequences of such a System; he felt alarmed and as we all know spoke of it in the house of Lords; which excited much public curiosity And Some ridicule; on the justice of which Gentlemen will now have the opportunity of judging; however still anxious on a subject which his talents gave him a facility to understand; he took the trouble about the year 1803 to form a committe of Gentlemen to consider the principles and powers of my inventions, and get all possible information on the progress I had made, which committee I believe made a report to the then Minister Lord Sydmouth; whose attention was awakened to it; about this time May 1803 there was an english Gentleman in London who had known me for some years in Paris; Dr. Grigory became acquainted with him; had many conversations with him on my plan and its consequences if carried into effect; the Dr. Communicated what he had learned to Lord Sydmouth and it was agreed to send the Gentleman to Paris to induce me to come to London; when he communicated his mission to me, he said the British Government wished to us my submarine Vessel against the French fleets; I replied that in this there must be some mis-

take that it was neither the interest nor policy of the British government to Introduce such a Vessel into practice; he Said on consideration that might be true; but Ministers wished to be fully acquainted with the properties of my inventions; and wished me out of France and in England; that would I go over and explain to them my engines I should be rewarded in proportion to their Value; I asked if he had any written proof that such was their intention; he said no, that it was too dangerous to carry letters on such a subject; but as a proof of their liberality and the prospect which I had of being treated in like manner; they had given him 800 £ to pay his expences and mine in bringing me over; Knowing the Gentleman to be a man of Integrity; I believed such might be the wish of Ministers, Yet I would not move without some plan and written proof of their intention. I therefore desired him to return with the following proposals and if Ministers agreed to them I would come over,

First, For leaving France and the pursuits which at present occupy me, and for going to England I [demand] require the sum of Ten thousand Pounds;

Second, On my arrival in London Government shall within three weeks, mane a committe to examin the following principles of submarine Navigation and attack;

First Principle

That a Submarine Vessel 35 feet long, 10 feet wide, an 8 feet deep, capable of containing 6 persons, shall have the property of sailing like an ordinary fishing Boat;

Second

That her capacity including her machinery shall be sufficient to hold provisions for Six persons to continue at Sea for twenty days;

Third

That Six persons can enter such a vessel & descend in her under water at pleasure,

Fourth

That the Six men can continue under water three hours without renewing the air,

and of Ministers agreed to them I would come over,

First To leave France and the pursuits which at present occupy me, and for going to England I require the sum of Ten thousand Pounds;

Second, On my arrival in London Government shall within three weeks, name a committee to examen the following principles of submarine Navegation and attack.

First Principle

That a Submarine Vessel 35 feet long, 10 feet wide, and 8 feet deep; capable of containing 6 persons, shall have the property of sailing like an ordinary fishing Boat:

Second

That her capacity including her machinery shall be sufficient to hold provisions for Six persons to continue at Sea for twenty days;

Third

That Six persons can enter such a vessel & descend in her under water at pleasure,

Fourth

That the Six men can continue under water three hours without renewing the air,

Fifth

That to renew the air, it is not necessary the Vessel should appear above water, but approach the Surface two tubes project, through one

MANUSCRIPT PAGE OF "DRAWINGS & DESCRIPTIONS"

Fifth

That to renew the air, it is not necessary the Vessel should appear above water; but approaching the Surface two tubes project, through one of which the mephitic air is discharged, through the other fresh air is drawn into the Vessel, which operation can be performed in 3 or 4 minuets, to continue again three hours under water; in this manner a crew can conseal themselves under water during the day, on renewing the air 4 times, hence might lie many days in the Neighbourhood of an enemy unperceived,

Sixth

That the crew can raise her to the surface at pleasure hoist sail and proceed on their [Voage] Voyage; as before descending;

Seventh

That where the water is not more than Sixty fathoms deep, and the current not more than four miles an hour, she can cast anchor and continue under water at any depth from *one* to fifty feet; that she will there remain as stationary as Vessels usually are while anchored on the surface;

Eighth

That in open Sea where bottom is not saught, she can plunge with safety and continue Under water while the air is respirable; but in this case she must drift with the tide like a vessel which cannot anchor and has no wind,

Ninth

That in Still water and while under water, she can move forwards, or backwards, to the right or left, mount or descend at pleasure;

Tenth

That She is capable of carrying 30 Submarine bombs each containing 100 pounds of powder

The preciding properties are all which are necessary, to a plunging Vessel, such a vessel cannot be taken in consequence of the ease with which she can hide under water during the

day, she can make her approaches [in the night] in the night and must be considered as a masked [battery] Magazine which can lie secure in the neighbourhood of an Enemy watch an opportunity to deposit her cargo of Bombs and retire unperceived.

Should the committee find the properties here specified within the laws of physics, and by the ordinary course of improvement reducable to simple practice, the investigation will there finish; but should it so happen that I cannot make the committee feel these truths without Occular demonstration, I reserve to myself the power of building a submarine Vessel, for which the Government shall allow a sum not exceeding ten thousand pounds; to be paid progressively as I may think proper to call for it to proceed with the work,

Of the Submarine Bombs,

That a copper case containing from one hundred to three hundred pounds of powder, coming into contact with the bottom of a Ship of any size and explosion there taking place will completely destroy her; that the machinery attached to such Bomb is so contrived [to] as to cause explosion when the bomb strikes the Vessel, or when the Vessel strikes the bomb; or at any time desired from 4 minuets to 13 hours or, 8 days; If the Committee are not to be convinced of this without experiment and will appropriate any kind of Vessel I will blow her up with a submarine bomb to give demonstration;

When the properties of the Submarine Vessel and Bombs are demonstrated and admitted by the committe, a new succession of Ideas will of course result, it will be seen that England may draw advantages from these inventions, or they may be turned to the total destruction of the British marine; in either Case it is of importance to the British Government to have the entire command of Such engines to do with them as they may think proper;

But as these inventions are the produce of my labours for some years, I now consider them as rich gems drawn from the mines of science and which I and my friends have a right to convert to our own advantage and which I now offer for sale to the British Government; For putting the Government in full possession of all the combinations and movements of the submarine Vessel; so that any Engineer of good talents can

construct one, and navigate her; also for explaining the combinations of the submarine bomb, and the modes of attack which time and experience will multiply and perfection; I [demand] require the sum of one hundred thousand pounds Sterling —;

When the Gentleman departed with these proposals it was agreed that I should go to Holland and wait his return, I did so, and staid at Amsterdam three months; contrairy winds prevented his arrival; I Abandoned the negotiation and returned to Paris where he arrived in a few weeks with the following letter from Lord Hawkesbury —

Sir:

Your proposals have been considered with that attention which the merit of the invention deserves, you must well know that it would be contrairy to Established rules to grant such sums as you require, before your invention authenticated by actuel experiment in presence of persons appointed by this Government, in order that a fair opportunity may be granted of appreciating its merit and adiquacy to the end proposed; The responsibility attached to his Majesty's Ministers in their official capacity renders it impossible for them to advance the sums which you have required; in the form pointed out by you; without exciting such public attention as must be equally unpleasant to you and His Majestys Ministers; if however you have sufficient confidence in His Majestys Government to offer them your invention, you may rely on being treated *with the utmost liberality and Generosity.*, Though this Government and you, have every reason to be satisfied with the zeal and activity with which your friend has conducted the business, Yet a negotiation personally conducted would smoothe many difficulties, and every facility and protection you can desire shall be granted you,

And should you be disposed to accept Active employment from the British government you may rely on the most liberal treatment, proportioned to your efficient Service; —

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This letter was brought in cipher; I Shortly after left Paris and arrived in London on the 28 of April 1804, On My Arrival Lord Sydmouth and Hawkesbury, were out of office and Mr. Pitt was minister To him I proposed the terms before men-

tioned; But Mr. Pitt and Lord Melville instead of arranging with me on the terms of my proposals; prefered making an attack on the Enemy with part of my engines; and as a fair prospect of emolument, at least equal if not superior to that which I had expected; I was to recieve 200£ a month during the time Government detained me on this business; and half the Value of all vessels of an Enemy which might be destroyed by my engines in 14 years; His Majestys Dockyard and arsenals were to furnish every necessary means to render my plan, efficient; useful to the Nation and Consequently productive to me; and on these principles a contract was entered into which is inserted in the body of the arbitration Bond,

*Here read the Bond and contract;*

On drawing up this contract I foresaw that Ministers might discover the bad policy of introducing the whole of my engines into practice; and therefore would not organize it nor exersise men to it so as to render it productive to me; and this has proved to be the fact; Government may be said to have abandoned this plan And it will be seen during the investigations that their true policy is to abandon it; if so, from whence are my profits to arise, what is my interest in it with this Governmt for 14 years, where is my emolument equivalent to the sum of 100 thousand pounds mentioned in the proposals? sent to Lord Hawkesbury.

Now Gentlemen I foresee before you enter into an examination of my engines and their final consequences; that you must as true friends to your country advise ministers [to] never to use them, but to conseal them if possible from the world; it will then become a consideration whether 40 thousand pounds is a reasonable equivalent to me and my friends for abandoning engines of such importance to this government to do with as they may think proper, — and for ever giving up the prospect of gain which was held out to me on coming to this country; or which the contract presented; had my plans been organized and carried into effect on System; But your powers are confined within the limits of the arbitration bonds; whatever may be your opinion you cannot exceed the sum of 40 thousand pounds But from your report as men of science and calm delibiration; Ministers will be able to Judge of the reasonable, hopes of the proprietors of these inventions and not only of

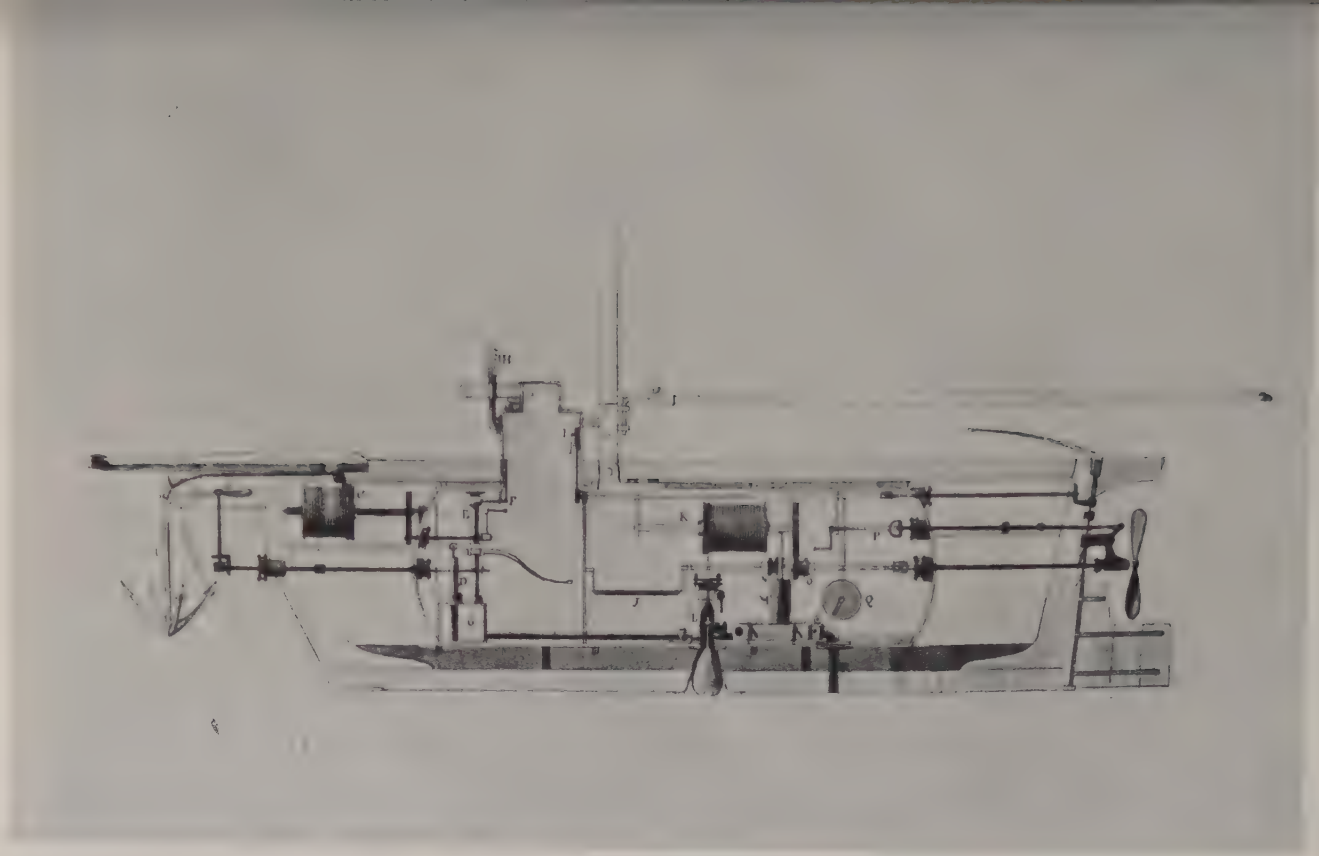
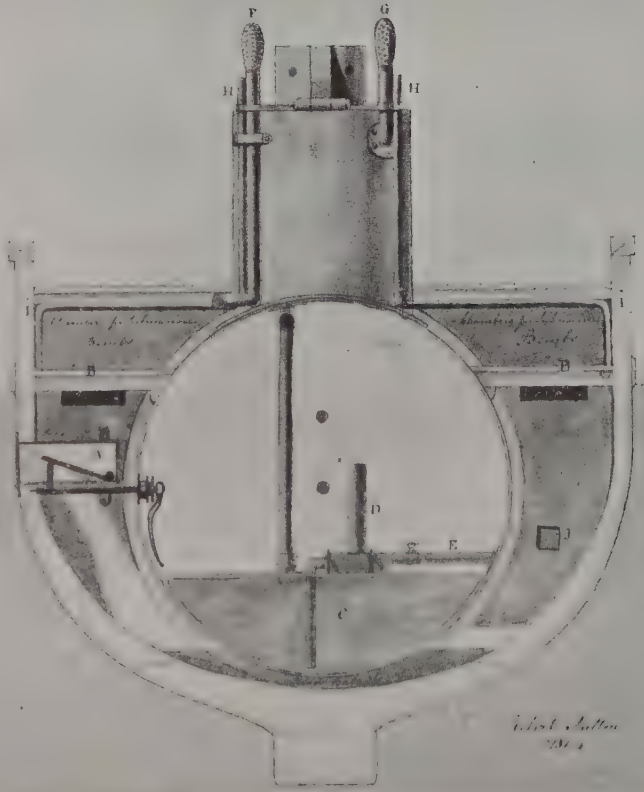


PLATE THE FIRST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justice towards them, but of the real interest of the nation; in now finally Setteling with me for the parties concerned;

No Man can in Justice Say that we have not a right to make every possible profit of these inventions; And we have a right to accept Mony, or to abandon mony for fame — or raise our demands in proportion as time and new Idas develop the importance of these discoveries; But I have the pleasure to say that the gentlemen with whom I act, have never troubled me with one ungenerous or illiberal wish to raise their demands, they conceived these inventions worth at least the Value of one first rate man of war or 100 thousand pounds; and they have never deviated from this first proposal — on my part I Saw that government could not grant any sum with propriety, unless there was reasonable security given, that the proprietors would never communicate the engines to any nation or persons to the injury of the British marine; and there Is but one mode of giving such security That is to bind these proprietors by their own interest to keep the secret, I therefore Voluntarily offered that should I be entitled to the 40 thousand pounds; to receive one moiety in cash, and an annuity equal to the full value of the other moiety; which annuity is to be forfeited Should I be the means of Introducing My inventions into practice against the British marine; perhaps this is the Strongest proof a man can give of his own sense of Justice and it Should be a convincing proof of my confidence in my own power over the fate of my inventions, and the good Opinion I have of the integrity of my friends; but whatever may be done in this business in capital or annuity; the annuity must depend on my life as their names cannot appear, having so far stated facts gentlemen will deliberately consider the engines the modes of using them their ultimate consequences, the Interest of the Nation, and a reasonable compensation to the proprietors;

The first consideration will probably be the accounts, of which the following is a statement,

Of the Accounts,

The sums of money received and expended by me are as follows

| | |
|---|---|
| 1804 July 19 of Mr. Hammond ..... | 200 |
| 1804 [April] August 11th of Do ..... | 1500 |
| | £ 1700 |

Article the Second of the contract states that 7000 £ shall be allowed for Mechanical preperations, this was for the first experiment; but after the attempt off Boulogne on the Second of October 1804 where Lord Melville was present; he entertained such hopes from the engines, that he and Mr. Pitt, *then at Walmer castle,* ordered more Locks and large copper coffers to be made; and for this purpose a further sum of 3000 £ was about the month of November or December 1804 placed to my order in the house of Missrs Davison and Co. At this time Ministers were so well satisfied with the prospect of success from my engines, and feeling the right which I had to a remuniration, for neglecting other pursuits and coming to this country, and for the communication of my engines to them that they granted me for my own use the Sum of Ten thousand pounds; it will be seen by a letter from Mr. Davison to Mr. Hammond, that this sum was also granted me to relieve me of some pecuniary embarrassments and was considered by them as a reward for past services; not to be refunded should nothing more be done or required, but to make part of any future sum which might be awarded to me

Again on the 9th of October 1805 about the time Sir Sidney Smith took the command off Boulogne; Lord Castlereagh thought it right to have more locks, Bombs, Boats, and preperations made; and for this purpose Also to pay old accounts I received of Sir Sidney Smith ..... 4045£

| | |
|---|---|
| Of Mr. Hammond first Sum ..... | 1700 |
| Of Do Second Sum ..... | 7000 |
| Of Do third Sum ..... | 3000 |
| For my private Use ..... | 10000 |
| | 25745£ |

By an error in Mr. Cutlers accounts he has refunded 1,000 £ to the treasurer of the navy, which leaves 24745 £ to be accounted for, of this sum it will be seen by the bills and receipts which were submitted to the commissioners of the Navy and

£ S P

passed by them that 11353.. 3.. 2 has been expended for government uses And 13391.. 16.. 10 to my own use

| | |
|---|---|
| First a remuniration ..... | 10,000 |
| Second my salary from the 20th of July 1804 to the 20th of August 1806 or 25 months at 200 £ a month..... | 5,000 |
| | £ 15,000 |

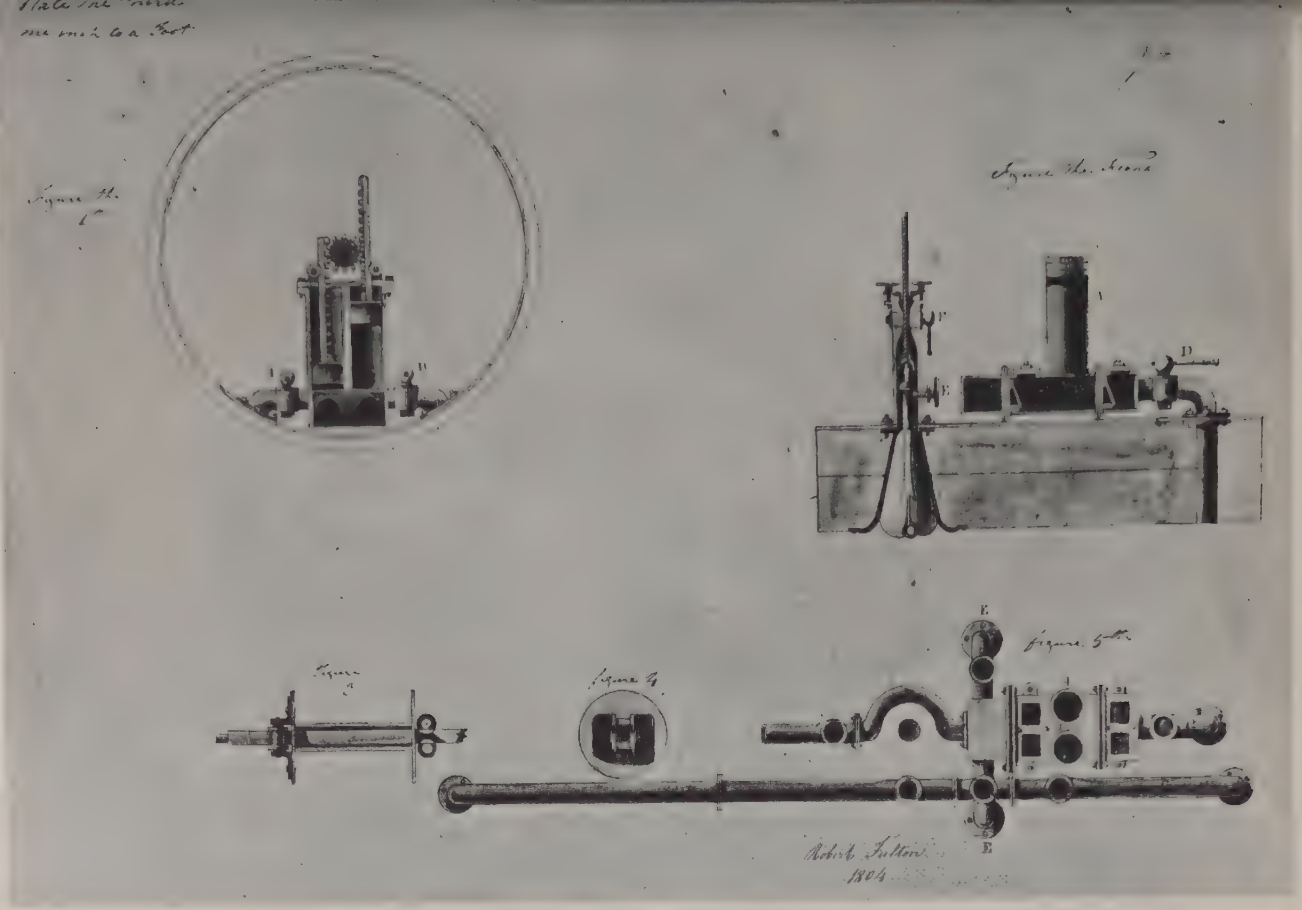
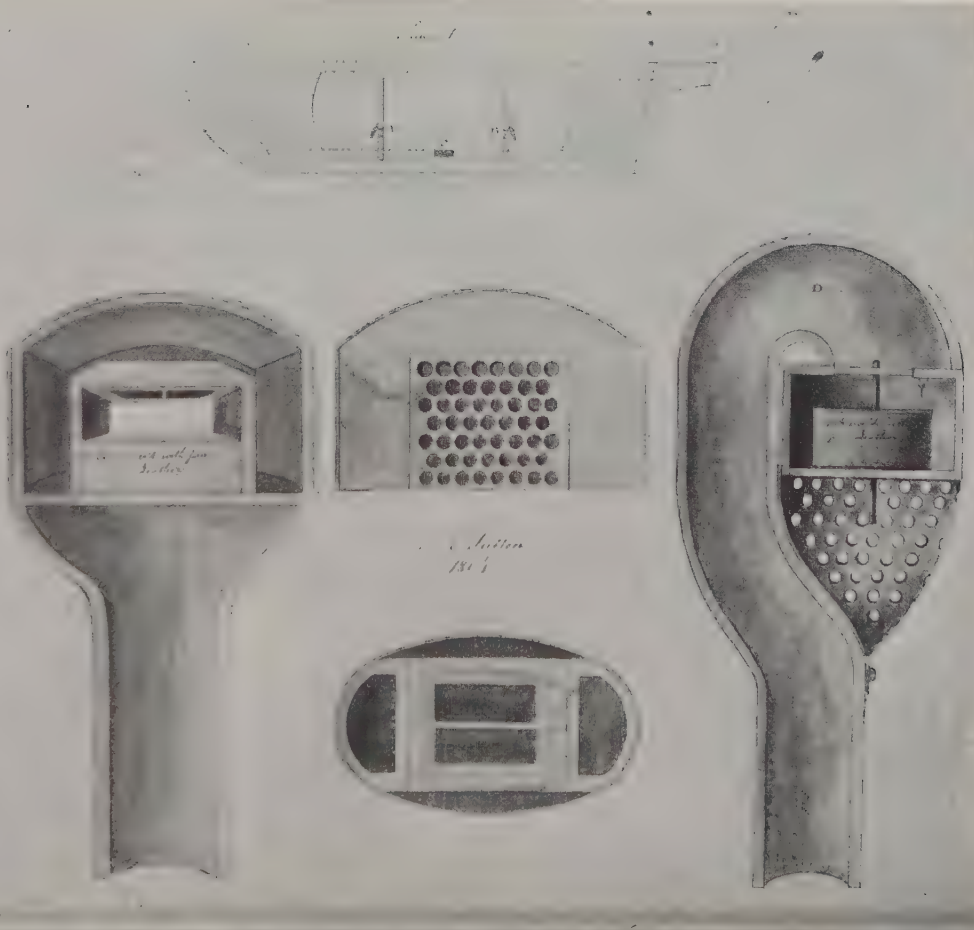



PLATE THE THIRD



As my right to the Salary cannot as I conceive be questioned for I have continued in this Country to get the decision of ministers; and Should the 10 thousand pounds remuniration be admitted Government will owe me on this Account 1,608.. 3.. 2, such are the sums received by me and the Gross of their distribution the accounts will explain the details.

ROBERT FULTON

London august 10th 1806

## Description of the drawings of the Submarine Vessel, submarine bombs, and mode of Attack

---

*Plate the first half an inch to a foot,*

The incompressible part of this vessel in which the men are when she descends under water, is composed of cast brass cylenders 6 feet diameter and 6 feet long about one inch thick; which will be of a strength to resist the pressure of more than one hundred perpendicular feet of water; Three or more of such cylenders may be screwed together at the flanges to make a length of 18 or 24 feet; the ends forming a part of a sphere to resist the pressure of the water in all directions; The dome where the Men enter may be three feet diameter three feet high; with a smaller dome on the lid through which observations may be made when raised a foot above the water:

The cylender and dome is placed in the body of an ordinary shaped vessel; and the water chambers for sinking will be round the cylender as seen in plate the second;

In this place it will only be necessary to mention the different parts which compose a submarine Vessel, any person acquainted with mechanics can trace their movements and uses,

*A* The bow anchor,
*B* The plunging flyers communicating by two angle wheels to the insides;
*C* The bow cable, its windlass Slides backwards and forwards on a square axis and lays the cable in regular coils;
*D* A small safety pump to drive the water out of the balancing chest *G;* suppose this pump one inch diameter, a column of water one inch diameter and 300 feet high would weigh about

150 pounds; hence one Man with a lever of three to one; could work such a pump under a pressure of 300 feet and rendering the Vessel lighter than her volume of water, could mount from that or even a greater depth to the surface;
*E* and *F* a pipe and cock to let the water into the balancing chest *G;*
*G* The balancing chest of a capacity to receive from three to five hundred weight of water, when the outer chambers are full, the Vessel being still from three to five hundred pounds lighter than water; Water is then let into the balancing chest correctly to such a weight that the flyers or plunging anchor can hold her under water;
*H* A air pipe to let out the Mephitic air; there is a similar one which extends to the stern, and enters a Ventilator *Q* by which means the air may be renewed in the Vessel;
*I* A movement to work the rudder while under water; on going to plunge the man who steers must take the helm off, this should always be his first act least he should forget it,
*K* The windlass of the plunging anchor sliding like that at the bow;
*J* The crank of the stern flyers; of the pumps, and of the plunging anchor; all these movements to be performed at pleasure by sliding the little wheels *N* and *O* in & our of gear;
*P* A screw movement to hoist the stern flyers out of gear; and out of water when the vessel is under sail,
*M* The pumps to force the water out at the pipe *R.*

The mast descends the sail boom and mast are tied together and made fast to the deck before the operation of plunging commences.

*Plate the Second one inch to a foot,*

This exhibits a transeverse section *A* the Valve to let in the the water which rises up to the deck *B.B* from which to the upper deck all round the Vessel are chambers to hold submarine bombs; which are placed in the chambers through trap doors on deck; and which bombs being the weight of water will in plunging displace their volume of water; and not add to or deminish the weight of the Vessel; this is the best mode of arranging the bombs for were they inside they would be embarrassing and each one when taken out would require to be replaced with its weight of water —

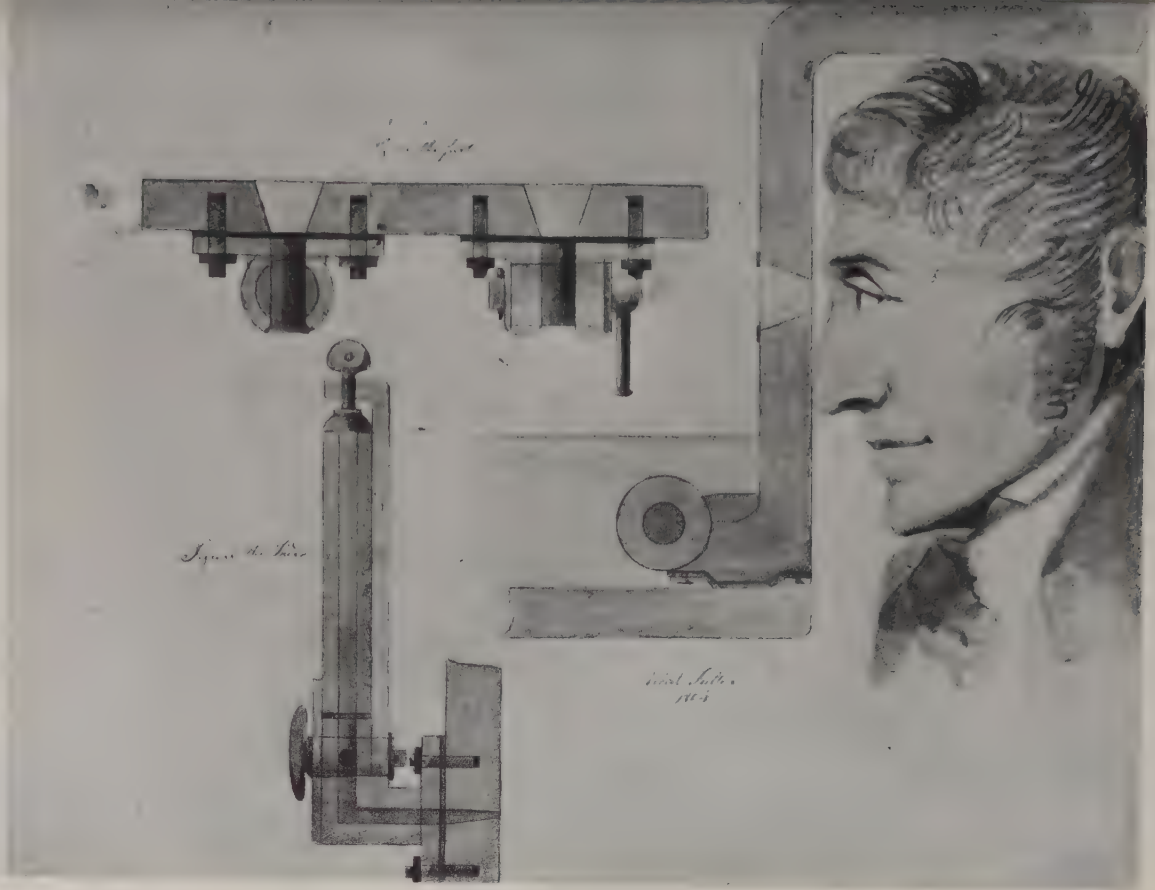
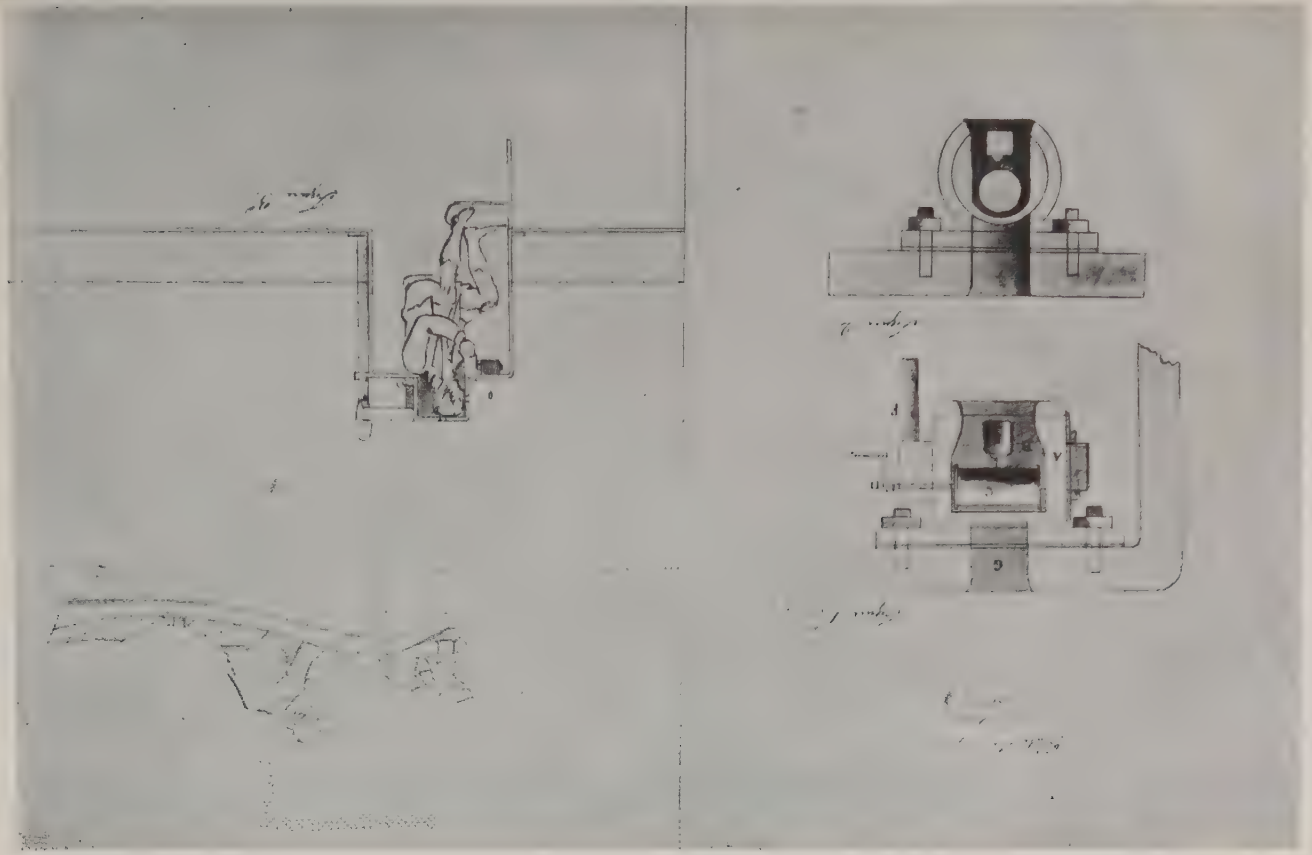


PLATE THE FIFTH



*F* The pipe to give air,
*G* The pipe to discharge the Mephitic air,
*H.H* Two air pipes to let the air out of the water chambers; they mount to the highest part of the Vessel to let the air in when the water is discharging; there should be at least four of these pipes; two in the bow and two in the stern; they may be lead from the stern along side and unite at *I.I* there the two mounting pipes *H.H* will be suffecient, care must be taken that the air can pass off with ease from all parts of the water chambers, or they cannot fill, nor can the vessel be got under water,
*C* The balancing chamber.
*D* The safety pump
*E* The discharging pipe
*J* Is a valve to let the water go from the centre chamber to the two ends, but not return, by this means water may be drawn from either end to balance the Vessel horizontal there are four such Valves,

All the communications with the exterior have cocks as will be seen in plate the third,

*Plate the Third one inch to a foot,*

Figure the first shews a section of the double forcing pumps *A* and *B* too cocks to draw the water from the right and left water chambers.
Figure the second a side View of the pumps *A* the pump *B* the valve which lets the water pass into the body of the pump *C* the valve which discharges the water by the cock and pipe *D* by shutting all the cocks and screwing off the top plates which cover the Valves they may be cleaned and put in order though the vessel were under water, Near the pump the plunging anchor *F* has a cock to stop the water in case the cable should break *E* is a screw on which the anchor cap rests while the anchor is up and thus its weight is taken off the cable,
Figures the 3d and 4 represent a side and end view of the Cable windlass and the mode of sliding on its axis,
Figure the 5th Shews the whole communications of the pump tubes the great water chamber being divided into three parts, it is necessary to drive water out from the middle or either end at pleasure *A A* the pump seats *B.B.B.B* the four valve chambers *C* the discharging tube through the bottom, *D* a

tube to draw water from the Balancing chest *E.E* to draw water from the right and left middle chambers only one of these are necessary as the water communicates by the Kelson to both sides
*F* To draw water from the bow chambers,
*G* To draw water from the stern chambers,
*H* The seat of the plunging Anchor,

*Plate the 4th*

Figure the first drawn by a scale of one quarter of an inch to a foot, Shews the incompressible part laid down in the body of a boat, *A* and *B* the divisions which form the length of the vessel into three water chambers, with the valve to let the water from the middle chamber to the two ends; but not return; *C* is a passage for the water from one side to the other. The other figures are of the real size, shewing the modes of constructing the air pipes with cork valves to let in the air and keep out the water;

*Plate the 5th real Size*

Figure the first shews the mode of placing the conic glass windows with the stop cocks in case of accidents; Figure the second the lid and cap of the dome; A head taking an observation through a window; this mode of making a window conic renders it as strong as the surrounding brass, *as relates to the pressure of the water,* a stroke only can break them; Figure the third is a Bathomater, to shew the depth under water.

*Plate the 6*

This is an addition to the dome more curious than useful; it is a mode of sending up a note and bringing down an answer while the Vessel is under water, Figure the first *A* is a cock with the cavity *B* in which there is a small reel; *C* the handle of which runs to *D*. . . . *E* is a piece of Cork, the note is to be written on a piece of parchment, tied round the cork or put into it, the cock is them turned by the handle *F* to face the opening *G;* the reel is then turned off and the cork mounts to the surface attached to a small silk line, when the answer

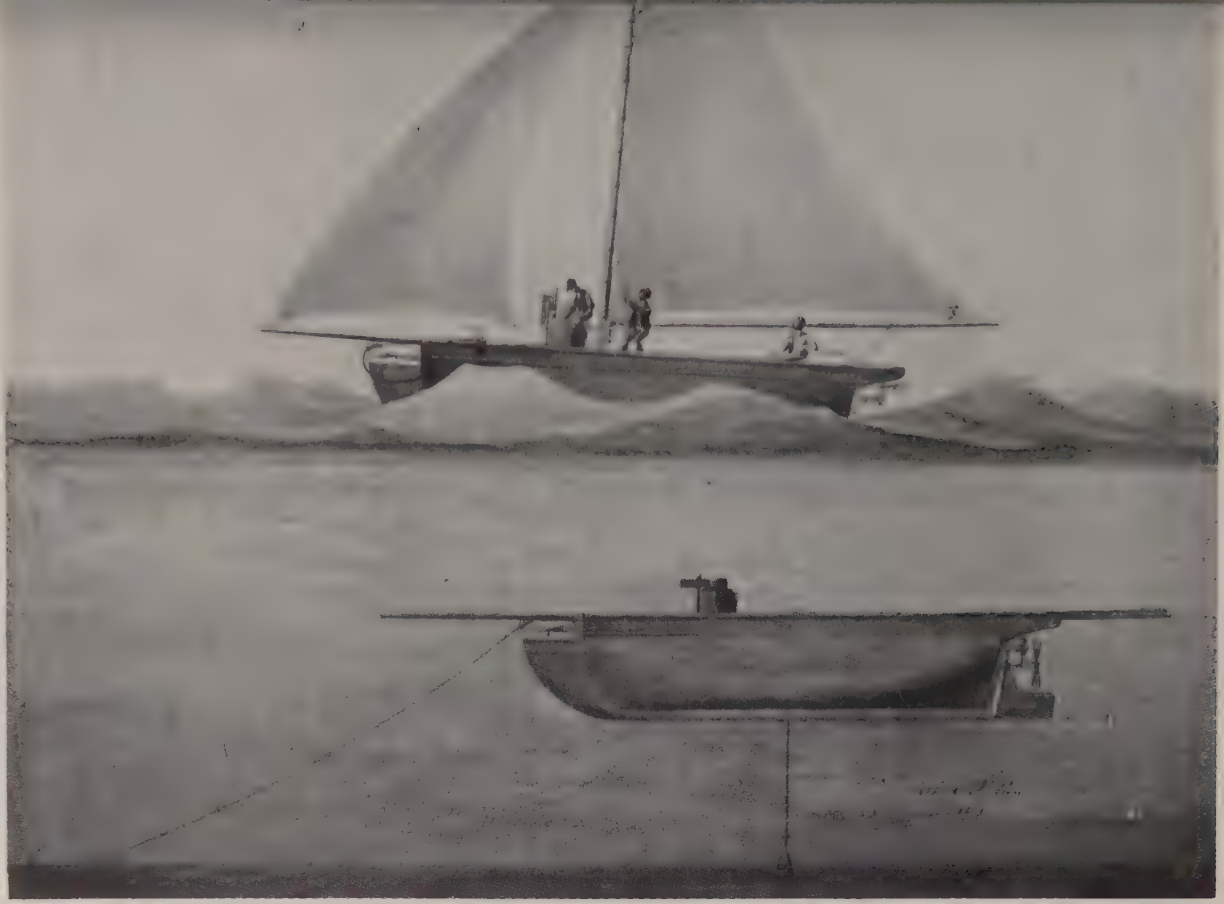


PLATE THE SEVENTH

is fixed to the cork the man below wind it down into the cock which being turned towards the inside of the Vessel the answer may be taken out.

Figure the second is an end View.
Figure the Third shews a man operating & the cork mounting, this may be useful in making experiments;

*Plate the Seventh one quarter of an inch to a foot*

This shews the submarine vessel under sail and at anchor under water with her plunging anchor out,

These seven drawings with this discription will enable any able mechanician to construct and perform the experiments of a submarine Vessel; It is not intended that she should go under or near the vessels which are to be attacked, her use is to enable the weaker maritime nations to attack the stronger without being detected or interrupted in their operations, hence She is contrived to hide under water when pursued, where she may continue the whole day and approach the fleets and harbours of the enemy in the night, there anchor her cargo of submarine bombs under water, or leave them to the tide, or use them in any other way which time and practice may point out; and retire unperceived for another cargo and deposit them in like manner on the coast, in the mouths of rivers in harbours or among fleets at anchor, and thus place Such numbers as would render it impossible for any Vessel to move through them without the imminent danger of being blown up and totally annihilated;

Of the submarine Bombs and modes of Using them.

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As Government are in possession of the real locks and Bombs with the modes of arranging them for action it will not be necessary to make detailed drawings of the several parts.

*Plate the 8th*

Shews a bomb arranged with an instantanious lock, and anchored from ten to twenty feet under water, for this purpose when the bomb is arranged with its lock it should be ten or

fifteen pounds lighter than its volume water, it will then have a tendancy to mount to the surface but must be held down by an anchor or weight of 20 or more pounds; as the depth of water in all channels, bays and Harbours is known, the line *D* should before setting out be of such a length as will hold the Bomb from 5 to ten feet under water at low water, it will then be that number of feet added to the rise of the tide at high water,

At Slack water it will stand in the position *B* perpendicular from the anchor at half ebb or flood when the current is strong it will be inclined to *A* or *C* where the action of the water on a flat board which is fixed to its bottom at *E* will keep it in the position here deleniated on the 5th of June in this year this experiment was made by my desire by Lieutenant Wm Robinson In Dover roads; and the result was as here described — A vessel under sail and striking on the Trigger *F* of such a Bomb would be instantly blown up, as will be seen in plate the Ninth,

*Plate the Ninth*

In this drawing *A* represents the Brig Dorothea as she blew up near walmer Castle on the 16th of October 1805, the bomb made use of on this occasion had a clockwork lock set to 15 Minuets the bomb contained 180 pounds of powder; and was coupled by a line of 70 feet in length; to a bomb which was filled with peas and which served as a counterbalance; As the boat run within the Buoy, one was thrown to the Larbord, and one to the Starbord side of the bow, and at the distance of 60 or 80 yards from the brig; as the tide drifted them along the coupling line caught the cable, the pressure of the tide then drove the bombs under her bottom near the Keel, where the explosion taking place she opened in the middle was completely decomposed and in 20 Seconds disappeared, which experiment has proved that wherever such an explosion takes place under the curve of a Vessels bottom; so that the action must be perpendicular through her, certain destruction must be the consequence; *B* represents a Ship under Sail, *C. D. E* Bombs anchored as described in the last plate, she moving towards and among them with the risk of contact and destruction;

PLATE THE EIGHTH

*Plate the Tenth,*

Figure 1st shews the mode of suspending the bomb to the cork floater *A;* the line *B* has pieces of cork on it to keep it from sinking; the line *C* is a brace to prevent the tide driving the Bomb by the doted line to near the surface where it could do no execution: the line *E* will be longer or shorter in proportion to the draught of water of the vessel to be attached, which will be further explained in figure the *Third;*

Figure the Second is another mode of arranging the bomb *A. B. C.* are pieces of cork tied by small lines 8 or 10 feet long to the principal line *D* in this manner it is floated under water where it is not Visible nor in danger of being hooked or taken up;

Figure the third is a section of a ship shewing how the bomb lies when first it comes alongsides; here the suspending line *A* is of a length to bend round the curve of the vessel and lay the Bomb in the position *B.* where the explosion taken place; to get the bomb into that position two things are necessary *First* When it is loaded and has its lock screwed on, or a weight equal to that of the lock; it must be suspended in a tub of salt water and if too heavy it must have a cussion of Cork fastened to it; so as to balance it to two or three pounds heavyer than its volume of water; in which case its tendency downward being not more than three or four pounds a little pressure of tide will raise it or move it latirally; and that it may mount latirally, and move to the position *B,* it must be hung with an inclination to the tide, as will be seen in figure the *fourth,* in which *A* represents a Vessel to be attacked, *B* her cable, *C. C.* two bombs united by a line 100 or more feet long, which line is tied by the bridles *D. D.* when it touches the cable the tide drives the bombs alongside; the pressure of the tide on the angle *D* will then drive them under the bottom of the Vessel as seen in Figure the 3d.

The Bomb was thus arranged to blow up the Brig Dorothea,

To throw them in case of an attack it is only necessary for the Boats to run inside of the Buoy — ; which might be done of a dark night without being observed, or if Seen, would run little risk from musket shot in the dark, and at such a distance,

## Observations on these inventions

It having been fully proved that the explosion of a Submarine Bomb under a vessel will completely destroy her, it is now necessary to consider the expence of the two kinds of Bombs and their application; The expence of the Bomb complete, with the instantanious lock will be as follows

| | £ | S | D |
|---|---|---|---|
| Lock | 2.. | 0 | ..0 |
| Bomb of Copper | 2.. | 10 | ..0 |
| 100 lb of powder | 7.. | 10 | ..0 |
| Anchor or weight and lines | 2.. | 0 | ..0 |
| | £ 14.. | 0 | ..0 |

The Bomb with the clockwork Lock

| | | | |
|---|---|---|---|
| Lock | 10 | ..0 | ..0 |
| Bomb of Copper | 2.. | 10 | ..0 |
| 100 lb of powder | 7.. | 10 | ..0 |
| Cork and lines | 2.. | 0 | ..0 |
| | £ 22.. | 0 | ..0 |

The Average price is 18 £ and each bomb of 18 £ Value is of a power to do as much execution as a fire ship which costs 2 or 3 thousand; 6,660 of them may be made for 120 thousand pounds or the first cost of one first rate Ship of the line when engines of such destructive powers can be multiplied to so great a degree, and at an expence which cannot be felt by an opulent nation the practice of them may produce novel and serious consequences

In cases where a nation commands the seas as in the present state of the British marine, the Seamen can approach suffeciently near the Enemy's harbours and roadsteads to use such engines from common boats; by which means several hundred Bombs with instantanious Locks might be anchored in the passages leading to the Texel, Havre, Brest or other ports of

PLATE THE NINTH

the Enemy which would render it impossible for any Vessel to move in or out. But it may be said that the Enemy are already completely blockaded and England has no need for such a mode of war; this I admit, but this mode is less expensive than the Usual method of Blockading and destressing an Enemy's commerce; yet should the economy not be thought of importance Still this invention has to be considered in another point of View, and that of the most interesting kind, Which is;

how would it affect the commerce and marine of England had the French the means of anchoring 20 or 20 thousand such Bombs in the channels to the Thames in the Bays, Harbours, Roadsteads, and a long the coast of England, scotland or Ireland;

I will now endavour to Shew what an Economic simple and certain means this would give to France to totally destroy the British Marine

And First as to Economy,

The Boulogne Flotilla has cost the french treasury more than three millions Sterling, for this sum, more than Two hundred thousand instantanious Bombs might be made; with such a Magazine at Boulogne or Calais and 100 good row boats the Enemy might each dark night throw some hundreds of Bombs in the channels of the Thames in the Downs or along the coast, to the total destruction of the British Commerce, *And if her commerce cannot be protected what is the use of her Marine?*

I will now Shew that were this Simple System organized in France, it is not in the power of the whole British marine to prevent the practice of it to any extent which Bonapart might desire, and he certainly would desire the annihilation of the British Marine, —

For example. Suppose the French boats were to anchor 500 Bombs in one night in the waters before Boulogne; where the Blockading squadern usually cruise; some of the cruising squadern would most certainly be blown up, and the fleet would be obliged to Keep at a greater distance. The Bombs being anchored 6 Feet under water at low water, would admit of row and sail boats to pass over them without danger; while vessels drawing from 15 to 20 feet of water and running among them would be destroyed, The french Boats passing over the

Bombs or knowing the line in which they had anchored them; could the next dark night anchor another 500 still further out, and compel the blockading squadern to keep at a still greater distance; In fact 1200 Bombs would lay a whole line from Calais to Dover, allowing an interval of only 30 yards between each, and 12,000 which would only cost 168,000 £ would lay ten lines from Dover to Calais which would render it impossible for any Vessel to pass without certain destruction, and thus a Blockade of the whole Channel would be formed of which plate the 11 will give some Idea;

*Plate 11*

I have before observed that the french boats could not be prevented depositing the bombs in this manner; Ships of war could not prevent them Because they dare not approach where the Bombs are anchored; British boats could not prevent them because they could not always be on the watch; and Second because the french boats can or may be encouraged to combat any boats whatever; And the moment this System or any other reduces the British marine to Boat fighting, the revered Sovereignty of the seas will be for ever lost; Colonies must be Abandoned and the whole influence which England holds in the scale of nations will Vanish, This is the natural and obvious consequence of this system when reduced to practice and prosicuted by a powerful nation with energy and Spirit;
Ten lines of Instantanious Bombs or even a less number anchored in the British channel would cut off the greater part of the commerce of London and of England, The wealth of England and the existance of her fleets depend on her immense and uninterrupted commerce,
But should France ever possess a means to cut off or interrupt such trade, England would be obliged to submit to any terms which Bonapart might think proper to dictate, I think I have here shewn that the plan described would give him such power, Gentlemen will deliberately consider it and its consequences —

When Mr. Pitt saw the sketch of this engine of simple construction, easy application, and powerful effect, he observed that if Introduced into practice it would lead to the annihilation of all military marines, It was therefore agreed not to use it, — But when I speak of my interest and that of my friends in these inventions, I must call the particular Atten-

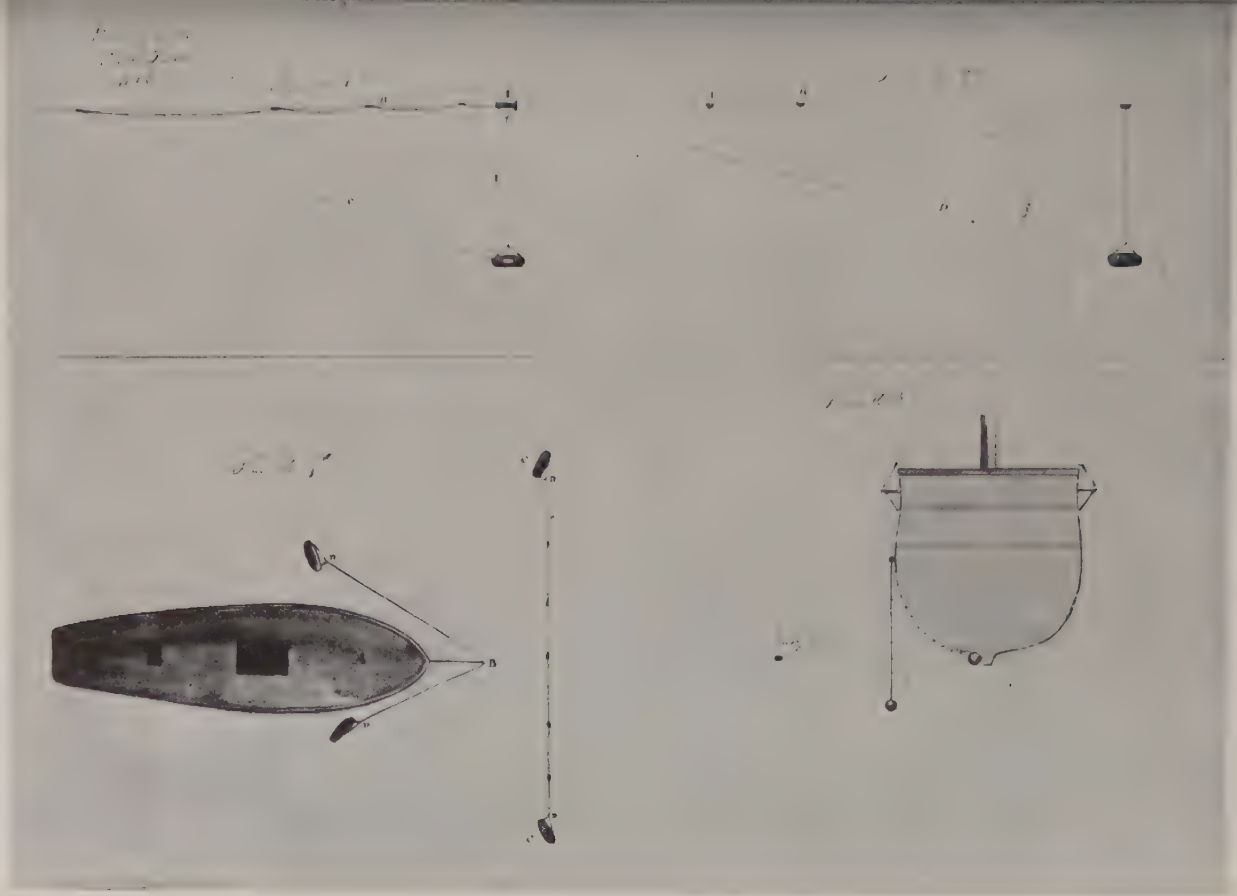


PLATE THE TENTH

tion of the Arbitrators to this engine to Shew that while in france I might have brought forward this system to the infinite Injury of England; I did not bring it forward but came to this Country by Invitation to explain the engines to government; and receive what might be considered a fair equivalent for inventions of such magnitude, leaving them to government to use or not as they might think proper; It must therefore be considered that my negative to France is a Positive advantage to England, and out of these Ideas will arise considerations on such sums or annuity as a Great nation can afford to pay for her own security, and which should in reason satisfy men possessed of inventions the consequences of which are incalculable,

After what has been said on the practice of the instantanious Bomb, it will be seen that the submarine Vessel is not of much importance nor necessary to Carry such engines into effect from England against France, or from France against England, but it would be of the first importance to the Sweeds, Danes, Dutch, Spaniards or Portuguise in a War against England for with such vessels they could come without risque and anchor instantanious Bombs in the British channel in the mouth of the Thames in the roadsteads and, along the coast, and distress the commerce to as great a degree as before described,

Each submarine Vessel constructed in the best manner would cost about 8,000 £ 10 of them could be built for 80 Thousand pounds, and each of them requiring 6 men to Navigate them, the total would be 60 men. Each Vessel could carry 30 bombs the ten could convoy 300, Besides the Bombs each could carry water and provisions for 6 men for 6 weeks, they are therefore calculated to navigate all the narrow seas of Europe and might anchor Bombs in any channel or roadstead where it might be thought necessary; Thus it is that this invention of submarine navigation and Submarine Bombs, gives to the minor maritime powers a decided advantage over the Major maritime Nations,

The manner of attacking a single ship with two clockwork bombs has been explained in plate the tenth; which mode I conceive will be allowed to be less expensive than fire ships and attended with less Risk than Bordage or any mode now in practice

But suppose an enterprise to send such Bombs in among the Shipping at Brest or any other open port; the tide run-

ning at the rate of two miles an hour, the clockwork being set to two hours would make it practicable to set the Bombs afloat at four miles distance from the Enemy; and they would arrive among the shipping about the time the explosions commenced; It would of course be advisable to get as near the Enemy as possible before giving the Bombs to the tide, and in allmost all cases it is possible to near them within two miles or a mile and a half in the night time; the clockwork should be set accordingly

*Plate 12*

Plate the 12 will Shew how the hooks are arranged to pass the Buoys and yet hook in the Cable; in all cases where the line of the Bomb may cross one; it is a round ended hook filled in with cork to keep it from sinking being round at the end it cannot hook in the Buoy, but if the line crosses a cable it will glide along till it comes to the hook and be caught, the Bomb will then drift alongside, and sheer under the ships bottom, this being a mode of attack it is to be considered what would be the risk of 10, 15 or 20 Sail were 2 or 3 hundred such bombs floated among them in one night.

But as Ships at anchor cannot follow or even fire to advantage in the night on boats which are 4 or 5 hundred yards off; it [necessarily] reduces the enemy to the necessity of defending themselves against boats, by boats —, this being the Case what could prevent 40 British Boats running with the flood into the harbour of Brest, there throw their Bombs across the Bows and retire with the ebb of night;? 16 oard cutters each with 4 or 5 marines and two swivels would complete such an enterprise with little risk for as the objects of the British Boats would not to fight but run: the oars would never be interrupted and their Velocity together with the fire of the marines would clear their way through any of the enemy's boats which could be ready to oppose them; but they would have another advantage for the explosion of the first bomb or the Blowing up of the first ship, would occupy all the enemy's boats In saving the men which would leave little or no opposition to the British Boats; I Leave to nautical Gentlemen to consider whether such an attack with such engines whose operation is instantanious; Is not practicable for British seamen in Brest harbour; and if at Brest, it is also practicable at Cadiz and other ports, and presents a more effectual mode

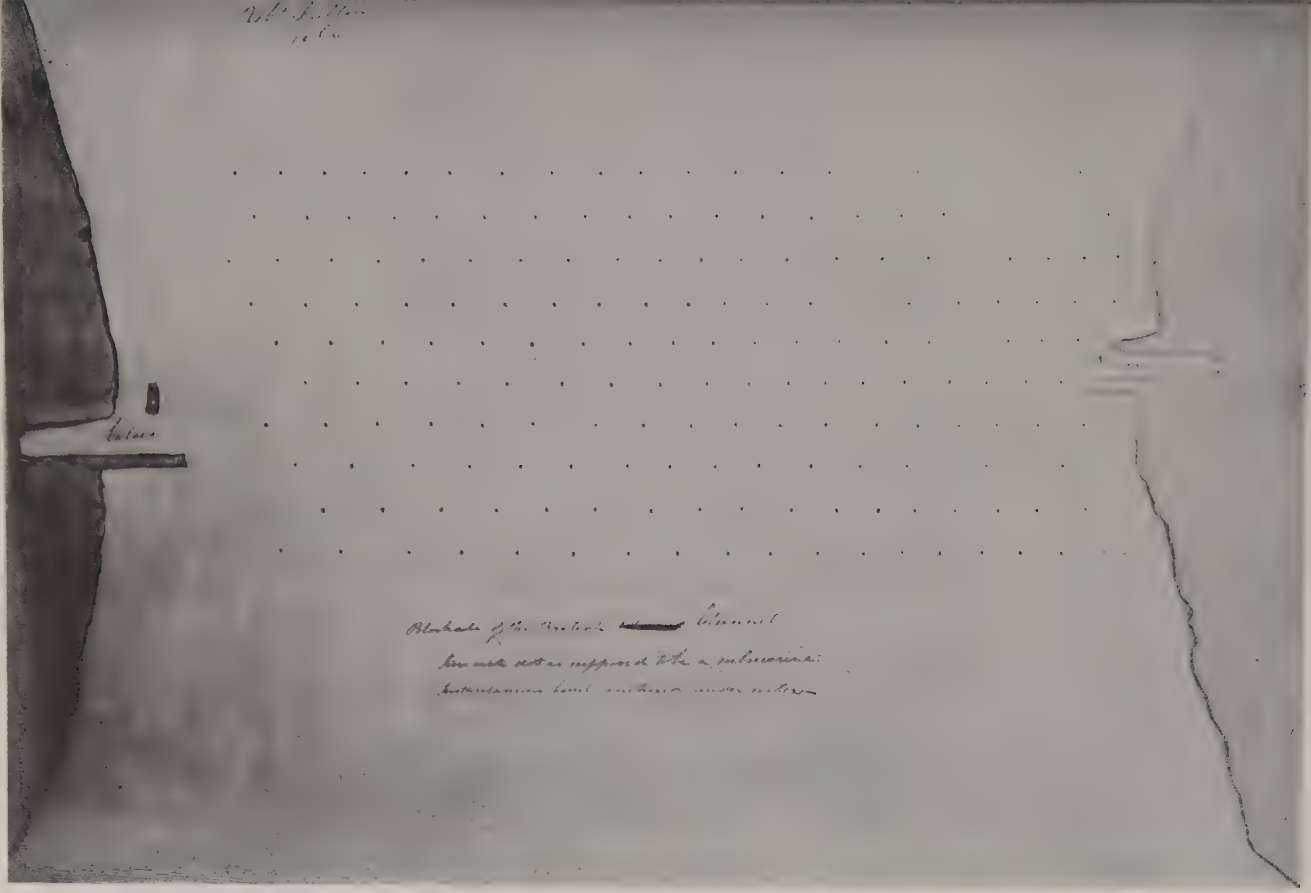


PLATE THE ELEVENTH

of destroying the Enemys fleets than any method now in practice and with less risk, But I do not expect Gentlemen to decide in favour of this mode of attack without first contemplating Galleys or cutters of the best construction, and picked men, habituated and exersised to the System and practice of the Bombs, — For as a morter is not given to the management of a lighthouseman, but to a Bombadeer, so these engines should not be confided to officers or men till they had been practiced in the use of them,

I have now described the leading principles of this mode of warfare; it is well known that all new inventions, and particularly those connected with a government, require years to perfect them, to render them fameliar, effecient; and introduce them into general practice; men must be exersised establishments must be made, and the plan whatever it is Should be pursued with System,

But when ever any invention, or project is within the limits of Physics and evidently practicable, it is to be reduced to simple operations and fameliar practice by time; and the inducement to perfect it is always in proportion to the magnitude of the object in View;

Every principle her ascerted has already been proved by practice, what then is wanting to make them productive of all the consequences here contemplated? only time and perseverence, even talent is hardly necessary; for all the principal defficulties have been overcome, the question therefore on the policy and true interest of this government concerning these inventions is whether they Should rest in their present state or be left to the proprietors to convert to their own advantage as they think proper;

As gun powder, Cannon, muskets, gun locks, and even flints, all had opponents prejudices and established habits to encounter; yet have in time totally Changed the art of war and the relative strength of nations: — So these inventions on submarine navigation and attack may now be considered as the Embryo of a total change in the military marine system; and the existing relative power of States; it, is therefore a subject not only of simple arbitration but one on which the Arbitrators as men of science should deliberate with the utmost care For it is now and by their means, that the present and future Ministers, *the guardiens of the interests of Great*

*Britain;* are to get exact Ideas on this subject, and fully make up their minds, whether there is anything to be hoped or feared from this system; Vulgar men see and admit only of such things as time and practice has rendered fameliar to all Mankind; Men of Sense and science penitrate from principles to future and certain effects

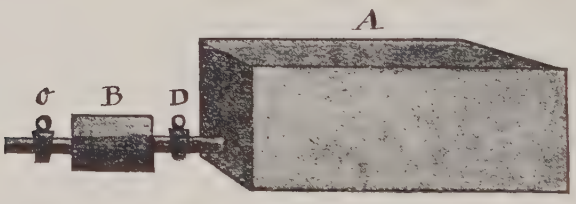
ROBERT FULTON

London,
August 10th 1806

## Additional Notes

### Of the supply of air in the submarine Vessel

The Cylender or incompressible part of this Vessel being 6 feet diameter and 24 feet long will have an Area of 672 cube feet on allowing a Man to consume the Oxygene of 20 Cubic feet in an hour it would be suffecient for one Man for 33 hours or for 6 men for 5 hours or should each Man consume the oxygene of only 15 cube feet in an hour and which is the usual estimate, there would be suffecient for 6 men for 7 hours or should a greater supply of air be necessary for any particular operation it may be done as in the following sketch




*A* is a cast Iron or copper box one cube yard or 27 cube feet. Into this 20 atmospheres may be compressed by proper pumps *B* is a measure of half a cube foot *C. D* two cocks *C* being shut *D* is opened and the measure *B* filled *D* is then Shut and *C* opened which lets the measure of air circulate in the Vessel, the 20 atmospheres compressed in in this reservoir would equal 540 cube feet of common air and suffice for the 6 men for 5 hours more and thus the 6 men might continue under water 11 hours in such case were they in a harbour or sur-

PLATE THE TWELFTH

rounded by a fleet they could continue under water all day and mounting with their air pipe out of water in the night renew the air for the following day, but this is contemplating an extreme case, a Vessel which can stay 4 hours under water can move 8 miles in that time where the tide is two miles an hour and could get out of any open harbour Such as Brest, Cadiz &

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On the weight of the Cylender and its Buoyancy

Suppose it cast one inch thick on calculating its cube inches and allowing 4 cube inches of brass to a pound it would Weigh about 8 tons. Its volume of water or 672 cube feet would weigh upwards of 16 tons, hence such a cylender hermetically cloased would float 8 tons lighter than Water

## Chapter VI

# THE BRITISH CONTRACT

Size of the "Drawings and Descriptions." Pseudonyms. Proposals. Contract with the British government. Was Fulton false to his principles in supporting Great Britain against France? His financial position under the contract.

The "Descriptions" that Fulton left in England were in two parts, of which the first is a recital of his negotiations and work, and the second a minute description of the boat and bombs. Both parts are wholly in Fulton's handwriting and cover twelve double sheets of paper, five for the first and seven for the second part. The sheets are $14\frac{3}{4}$ inches high with a double or folded width of $19\frac{1}{8}$ inches. The writing is on both sides of the sheets, so that exclusive of the outside pages, which are left blank, except for the descriptive recital on page 1 of the first part, there are 43 pages of writing. There are from 26 to 28 lines to a page with a margin of 2 inches on the left-hand side, and about 8 words to a line. The paper is heavy hand-made linen, slightly off the white in color with gilt on the edges. One-half of each sheet is water-marked with a design composed of a crown and fleur-de-lys surmounting the letters P & B, the other half of the sheet being water-marked Portal & Co. 1796.

The drawings are water-colored and are on sheets of heavy Bristol paper measuring $22\frac{1}{4} \times 18\frac{3}{4}$ inches. As will be seen each one is dated and signed by Fulton.

The "Bond and Contract" to which reference is made was found in 1812 among the papers of Lord Melville and was then deposited by his executors in the Public

Record office. With the exception of the Admiralty CIRCULAR given on page 52, the contemporaneous archives of the government contain little concerning Fulton's work, and are in this respect quite different from the French records. The explanation is that the British ministers were fearful lest information regarding the submarine should transpire to their detriment. They, therefore, treated all correspondence as confidential and kept letters and other documents in their personal rather than official files. In fact Fulton adopted the pseudonym of "Robert Francis," a designation that was frequently, though not exclusively, used by both the Government officials and himself in correspondence during the years 1804–1806.

The "Contract" was Fulton's own conception in form and substance, the government accepting the terms that he proposed. This is shown by his notes and copies of letters that still exist.

Lord Hawkesbury who had induced Fulton to leave France for England was Robert Banks Jenkinson (1770–1828). His father, created Lord Hawkesbury in 1786 and Earl of Liverpool in 1796, had served as Secretary for War from 1778 and therefore during the greater part of the American Revolution. The son, using his father's junior title of Lord Hawkesbury, became Secretary for Foreign Affairs in 1801 in the Addington ministry. As such Secretary, he would be the one to open negotiations with Fulton in Paris.

Fulton arrived in London on the 19th of May. Addington had been displaced by Pitt in the control of the government a few days before. Lord Hawkesbury, though no longer in charge of Foreign Affairs, continued in office, holding the portfolio of the Home Office in the new cabinet. In spite of his change of status, Fulton would naturally call on him as the only official with whom he was acquainted. In his note book, in which he

copied in neat hand the letter of Lord Hawkesbury that the agent " Mr. Smith " had handed him in Paris, he writes at the bottom of the copy of the letter, " I had an interview with Mr. Hammond on the 21 when he desired me to give in proposals they were as follows."

From this juxtaposition of names it is fair to assume that to Lord Hawkesbury he gave the name of Hammond. Fulton was fond of doing such things. His own attempt at personal disguise under the name of Francis was very thin. The coincidence that his real and temporarily assumed names began with the same letter will be noted. So do Hawkesbury and Hammond. The letters to " Mr. Hammond " are letters that would be written only to one who was high in authority. It was not in accordance with Fulton's character to send such communications as are the Hammond letters to a subordinate. In " Mr. Hammond " can be seen Lord Hawkesbury who had just been made a peer in his own right and was Pitt's leader in the House of Lords. This identification of " Mr. Hammond " will be borne in mind in connection with several letters given on pages 96 et seq. as well as those immediately below containing the proposals promised on May 21st.

London May the 22d 1804

Proposals for the examination of a System of Submarine navigation,

Having been invited to London by the late Administration to demonstrate the practicability of navigating under water and attacking and destroying ships of war by submarine operations I propose that government name a commission as they think proper to examine the following principles and give their decision for or against each article, which commission Should be composed of at least two able mechanecians and one Chymest, —

Then follows matter describing the plunging vessel almost verbatim with that given in the " Descriptions," beginning with First principle on page 56 down to and including the demand for £100,000 on page 59, after which the proposals continue as follows:

What plans government may have in View to draw the power of Bounapart into governable limits Secure perminant peace and forever remove all Ideas from the Side of France I do not pretend to Conjecture

I beg leave to propose one which will be prompt in execution and if Successful will forever Remove from the mind of Man the possibility of France making a descent on England I propose a submarine expedition to destroy the fleets of Boulogne and Brest as they now lie I am ready to exhibit the practicability of my plan or at least that the chances are many to one in favour of Success, and merits immediate attention as the Season is much advanced much is to be done and no time should be lost,

If government adopt my plan it must be organized nearly as follows,

One good Mechanecian must receive my drawings take my orders and see to the execution of the Machinery. An Active Sea officer must have power to choose 100 hardy seamen *out of the fleet* who are good swimmers about 40 tons of powder and 7 thousand pounds for various expences will fit out the expedition.

If government give into this plan I demand the following terms

A pay of 200 pounds a Month while I devote my time to the enterprise or till government notify that they have no further need of my exertions,

If Government appoint their own officers to make the Attack; from the directions I may give, without my going to Sea to direct it I demand only the monthly pay

But if government think proper that I go on board a Ship of war off Boulogne and Brest to direct the time and mode of Attack I demand one fourth the Value of each Vessel burnt or destroyed, In either case if I do not succeed I demand nothing for my trouble but the monthly pay before mentioned, till government notify that my exertions are no longer necessary,

Robert Francis

These proposals were sent under a covering letter to "Mr. Hammond" dated the following day.

London May the 23d 1804

Mr. Hammond

Sir I herewith send you my proposals for examining the principles of submarine navigation, also my proposal for a submarine attack on Boulogne and Brest, in this period of our communications it is necessary we Should clearly understand eachother, First Ministers will have the goodness to examine the mode I propose for investigating the properties and combinations of Submarine navigation, if they approve of it they will Sign it as a contract between them an me, then appoint a commission to decide which commission approving the reward follows; this part finished the expedition if thought proper is to commence on the terms specified

I have the honor to be with
much respect your most obedient

Robert Francis

Without waiting for his proposals to be accepted, Fulton's mind began working on the commission to be named. On June 12th he suggested to "Mr. Hammond" that the government and he should name an equal number, the majority to decide. On his part, he proposed Bishop Watson, Sir John Sinclair, Lord Stanhope and the Rev. Edmund Cartwright. Apparently Fulton had great faith in the efficacy of the church in this matter.

The Bond and Contract is on five pages wholly in Fulton's handwriting with an outside sheet with two dockets, one reading

Articles of Agreement
with Mr. Fulton
20th July 1804

The other

This attested Counterpart
of an agreement between
His Majesty's Government
in 1804 & Mr. Robert
Fulton was found among
the papers of the late
Lord Viscount Melville,
22nd Jan. 1812.

M——

Articles of Agreement between the Right Honorable William Pitt, first Lord commissioner of his Majesty's treasury and Chancelor of the Exchequer; and the Right Honorable Lord Viscount Melville first Lord of the Admiralty, in behalf of his Majesty's government on the one part; and Robert Fulton citizen of the United States of America and inventor of a plan of attacking fleets by submarine Bombs, on the other part,

The said Robert Fulton agrees to disclose the principles of his scheme to Sir Home Popham and to superintend the execution of it on the following conditions

*First* To be paid Two hundred pounds a month while he is employed on this Service for his personal trouble and Expences;

*Second,* To have a credit lodged from time to time for the payment of his Mechanical preperations, not to exceed Seven thousand pounds.

*Third,* That in His Majesty's dockyards and Arsenals shall be made or furnished all such articles as may be required, which are applicable to this purpose.

*Fourth,* If any circumstance should arise to prevent government carrying this plan into execution then the parties are each to name two commissioners for the purpose of examining the principles; and trying such experiments as they may think proper, And if it should appear to the Majority of the Members that the plan is practicable and offers a more effectual mode of destroying the enemies fleet at Boulogne, Brest, or elsewhere, than any now in practice and with less risk, then government is to pay the said Robert Fulton the sum of Forty Thousand Pounds as a compensation for demonstrating the principles, and making over the entire possession of his submarine Mode of Attack.

*Fifth* When the Said Robert Fulton has destroyed by his submarine carcasses or Bombs one of the enemies deck'd Vessels, then Government is to pay him the sum of Forty Thousand pounds, provided commissioners appointed As in the previous article shall be of opinion that the same Scheme can be practically applied to the destruction of the enemies fleets,

*Sixth,* If the Arbitrators differ in opinion then they are to draw lots for the choice of an Umpire and the Majority of Voices to decide all points of reference within the construction of this agreement and that decision to be final

*Seventh* One half the supposed Value of all Vessels destroyed by Mr. Fulton's Submarine Mode of attack to be paid him by government as long as he superintends the execution of his plan; but when government has no further occasion for his service; or that he wishes to retire, then he is only to be paid one quarter of the supposed value of such vessels as may be destroyed by his scheme, and this remuneration to continue for the space of fourteen years from the date thereof

*Eighth,* In case the Vessels destroyed by this scheme should exceed in amount Forty thousand pounds, then the Forty Thousand pounds first stipulated to be paid, shall be considered as part payment of the whole sum which may become due to the said Robert Fulton,

*Ninth,* If in the course of practice any improvemt Should be Suggested that can only be esteemed as a collateral Aid to the general principles of Mr. Fulton's mode of attack, then such improvements are not to deminish or set aside his claims on government,

*Tenth,* All monies which may become due to Mr. Fulton to be paid within six months from the time when they Shall be so adjudged according to the tenor of this agreement,

*Eleventh,* This agreement to be considered by both parties as a liberal covenant with a View to protect the Rights of the individual, and to prevent any improper advantages being taken of his Majesty's Government.

Mr. Fulton having deposited the drawings and plans of his submarine scheme of attack; in the hands of a confidential friend with the View to their being delivered to the American government in case of his death, does hereby bind himself to withdraw all such plans and drawings and not devulge them or any part of his principles to any person whatever for the

space of fourteen years; which is the term during which he is to derive all the advantages of their operation from the British Government,

The benefit of the foregoing agreement shall be extended to the heirs and executors of the said Robert Fulton,

Signed this Seventeenth day of July one thousand eight hundred and four

exchanged with a counterpart signed by the Right Honble William Pitt & the Right Honble Lord Melville

ROBERT FULTON

H.P.

Witness

Home Popham

The reading of these remarkable documents of such great historical interest, especially at this time when submarine navigation has been developed to the point of complete success, kindles many lively reflections.

The question is whether Fulton acted as a man of honor in abandoning the country for which he had volunteered to fight and where he had received such signal and loyal service from its citizens. Was he justified in transferring his support to another nation at war with France and thus help destroy the growing power of France for which country he had professed so much affection? This question has been debated by Fulton's biographers, although apparently none of them knew exactly what it was that Fulton had done for the British Government. They were all under the impression that his work consisted chiefly in the demonstration of the efficacy of torpedoes, carcasses or bombs as Fulton vicariously called them, or mines as we would speak of them today. Cadwallader D. Colden gives several pages of his book to developing, with some labor, an excuse for Fulton. Dickinson finds some justification in the fact that Fulton had been only partially reimbursed by the French Government for his work, but more particularly in that the development of

Napoleon's ambitions was repugnant to Fulton's ideas of republicanism. The last is without question the correct and only view to take.

A radical republican, hating blindly all forms of autocracy, he had remained in France believing that in France he would see the full flowering of his principles. He offered his inventions to the French Government, not for pecuniary gain, because his proposals show that he was willing to abide by their decision as to the monetary value to be determined only after he had achieved success, but because he thought that the French revolution was a real movement toward perfect liberty. To this end he offered not only his device, but also himself. He was anxious to be enrolled in the fighting force of France and go forth in his little boat to do battle against mighty England. When, therefore, he was refused by Bonaparte and his sincere offers scorned with absolutely unjustified insult, we can imagine his revulsion of sentiment and forgive any bitterness of feeling. In a moment his idol was shattered. He realized that those in control of the French Government were not actuated by a broad conception of world freedom, but solely by personal ambition and thirst for power. He makes this position quite clear in a letter to Lord Melville quoted by Colden as follows, though, before publishing, the latter must have edited the orthography: " In writing this letter, I feel no enmity to the people of France, or any other people; on the contrary, I wish their happiness; for my principle is, that every nation profits by the prosperity of its neighbours, provided the governments of its neighbours be humane and just. What is here said, is directed against the tyrannic principles of Bonaparte, a man who has set himself above all law; he is, therefore in that state which Lord Somers compares to that of a wild beast unrestrained by any rule, and he should be hunted down as the enemy

of mankind. This, however, is the business of Frenchmen. With regard to the nations of Europe, they can only hold him in governable limits, by fencing him round with bayonets."

France, his dearly beloved France, was no more liberal under the upstart clique of the consulate than was England under the régime of her long established autocracy. This is the only explanation of how and why Fulton abandoned his allegiance to France, went to England and there worked to strengthen the British navy that it might the more easily smash the growing power of the French fleet with which he had once so ardently desired to serve. He had been cruelly stabbed by the hands of his friends in the most tender spot in his heart. This cruelty that served to clear his vision he could not forgive, much less forget.

Fulton had undoubtedly been unfairly and even cruelly treated by the French authorities. His cherished ideas into which he had thrown his whole soul had been rejected without fair or reasonable examination. His pride had been deeply wounded. But Fulton was magnanimous enough to have overlooked this treatment had France herself remained true to his conception of her own ideals. It was not that Fulton abandoned France, but that France deserted Fulton. From his arrival in 1797, he thought that he saw in France a great exponent of a new world liberty, with freedom of trade, freedom of men, freedom of the seas, and above all an enduring world-wide peace. In his enthusiasm he believed that such ideals, in which he firmly believed, were not only practically realizable, but that France was about to make them the guiding principles of every nation. It was for that reason that he so warmly espoused her cause.

In 1797, soon after his arrival in Paris, he wrote to his friend Lord Stanhope his views based on what he

fancied to be the actuating theory of the French revolution:

My Lord

Hoping every month to Return to England, together with the difficulty of transmitting Letters to London, has hitherto prevented my Writing to you Since my arrival In Paris. But at present I have troubeled you with a very Long Letter, the object of Which I will here explain, — Since my arrival In Paris I have been Very active In my Canal pursuits, And on this Subject I have Created a Revolution In the mind of all the french engeneers I have met with, who are now descidedly In favour of the Small System of Canals — Which are now Contemplated on an emmense Scale of extension which you will See explained in my Letter — It is Contemplated to Raise the Whole Revenue by a Single toll on Canals which System will Infinately Simplify the operations of Government, tend directly to Set trade free and annihilate a Mass of Political absurdities which have hitherto disturbed the peace of Nations — all of Which you will find explained in the annexed Letter, Which Letter will Shew you how much Frenchmen are turning their mind to the true fountain of Riches — viz home Improvement and Systems of Industry. With the true philosophic Ideas which the entertain of Foreign Possessions and Restricted trade — And I Can assure you that I find In them the most Resolute determination to establish the principles which you will find explained And Which to me appears of the Very first Importance to Lasting peace — and the Wellfare of all Nations — It is therefore of much Importance that English Men Should know the truth of these principles and Learn their true Interest by Giving up as the french mean to do, and will Compel *others to do* the System of foreign Possessions and Restricted trade they should also understand that Frenchmen are Realy thinking Like philosophers Which I hope my Letter will prove.

By 1801, when his offer of his talents and personal service were spurned, Napoleon was already leading France far afield from the altruistic but impossible programme of 1797. In 1802, Napoleon had made himself consul for life. In the spring of 1804, he was

proclaimed Emperor of the French and the beautiful dream that had entranced Fulton for more than ten years had faded into nothingness, as dreams usually do. He saw that in the aristocracy of England he could find a truer democracy than in the demagogic leaders of France. Fulton was but human. His warm heart, artistic temperament and impetuous nature now asserted themselves and drove him back to the country whence his forebears had come, and away from the people whose governing powers had wounded his pride and had failed him in his ideals.

The " Descriptions " given above were written just prior to August 10th, 1806, and recite the course of events from the autumn of 1803. At the time they were signed, Fulton was arranging to return to America, and actually sailed about ten weeks later. His negotiations with the Government had not been satisfactory in that his devices had not been accepted and he had not received in money what he felt was due. The contract shows that Fulton, profiting perhaps by his French experiences not to put trust in princes, foresaw this contingency and provided against it in the Fourth article, that should any circumstance arise to prevent carrying the plan into execution commissioners should be appointed to determine whether the stipulated compensation had been earned. The " Descriptions " were prepared for submission to the arbitrators and were actually read to them, as is shown by a note attached to a copy of the manuscript reading as follows:

These papers I read to Sir Charles Blagden, Capt. Hamilton, the Rev. Dr. Cartwright and Alexander Davison, Esq., on the 18th of August 1806 these gentlemen being named Arbitrators to settle my Claims on Government under a contract which I made with Mr. Pitt and Lord Melville — the two last named acting for me.

The words " two last " refer, of course, to Dr. Cartwright and Mr. Davison. The " Descriptions," therefore, give Fulton's case as he saw it, and consequently are of intense interest and historical importance.

His vision for the United States that the population would increase from 5,500,000, as it then was, to 120,000,000 has already been almost realized, sooner, of course, than he expected, but the absence of colonies and lack of desire for them have hardly met an equally successful prophetic fate. Certainly he never foresaw Porto Rico, Panama, Samoa, Hawaii, Guam, the Philippines and other outlying possessions.

What a delightful picture Fulton unconsciously presents of the skillful and diplomatic way in which the British Ministry handled him from the beginning to the end! When the emissary, known only as " Mr. Smith," stated to Fulton that the Government wished to use the submarine against the French fleet, Fulton pointed out that it was not the part of wisdom so to do, that the British with their superiority in sea power had more to lose than to gain by developing such a weapon. In so doing, he but anticipated Earl St. Vincent who, bluff old sea-dog like so many of his profession to whom innovations in naval warfare were anathema, exclaimed that " Pitt was the greatest fool that ever existed to encourage a mode of war which they who commanded the seas did not want, and which, if successful, would deprive them of it."

" Mr. Smith " was very clever and was not put off by any such argument. He saw clearly that whether England needed the device or not, they must have control of the man who possessed the secret. He evidently felt sure of Fulton's sentiments because he told him quite frankly that they wished him " out of France and in England."

On the financial side, Fulton appears to have had a proper estimate of himself and the value of his devices.

The sum of £10,000 as a retainer would be no mean figure today, but owing to the difference in purchasing power it was comparatively a vastly greater figure in 1803. This retainer was in addition to his main fee or price for selling the explanation of his devices which he put at £100,000. The " Descriptions " read that he said " require " that sum. He first wrote " demand," which word he erased, but not sufficiently to obliterate it, and then wrote " require."

The rating of the value of his devices as being equivalent to a ship-of-the-line, or battle ship as a capital ship is now called, is certainly ingenious and not unreasonable. If his devices had any value at all they would increase the effective power of the fleet by much more than the addition of one first-class vessel.

But Fulton was dealing with men far abler than he in fixing values and making contracts. The negotiations were not broken off by abruptly refusing to pay the sums asked. That would have been a blunder that one selected for such a delicate mission would not be guilty of committing. The British representative apparently did not even suggest that the retainer was exorbitant, but only that it was " contrary to established rules " to pay in advance. Then, before giving an obligation to pay a sum commensurate with the value of the devices, the reasonable and unanswerable preliminary condition of an experimental demonstration was made a prerequisite.

The British diplomats unlike the French had avoided giving any offense to his amour propre. Though they refused to grant his financial requests, they succeeded in getting him to go to England, which was their main purpose. Not until they had him safe in London, did they take up the question of a contract. The original demand of £100,000 was reduced to £40,000. The retainer disappeared entirely except as it was represented

by such portion of the £800 with which "Mr. Smith" was furnished in the first instance to pay his own and Fulton's expenses. In lieu of the reductions, there appears in the contract an agreement to pay a salary of £200 a month. How deliciously clever! To one in the straightened circumstances in which Fulton always had been and still was, for even now any surplus of income of which he might have been possessed, but of which there is no evidence, was swallowed up by his steamboat experiments, this monthly payment must have been of inestimable importance. It guaranteed him comfort and at last a substantial excess for his other work, because his submarine disbursements were to be met entirely by the government up to a maximum limit of £7,000. On the other hand, the Government held secure the man, who as an enemy they feared, and who as such was a constant source of worry. This result was obtained at a cost that was to them a trifling figure.

Fulton appears to have concluded that his claim for £100,000 was perhaps too high because he voluntarily accepted the sum of £40,000 mentioned in the contract. Of this latter amount, he made to the arbitrators the ingenious suggestion that they pay him one-half in cash and the other half in an annuity based on his life, the annuity to be forfeit should the secret of his inventions in submarine warfare be divulged by him or his friends. It is regretted that Fulton did not disclose the names of his friends who were jointly interested with him, as they were probably the same who had financed his French experiments.

Fulton's receipts on his own account amounted on balance to £13,391 .. 16 .. 10, leaving due as he claimed £1608 .. 3 .. 2, exclusive of any payment in part or whole of the £40,000. As it was, he did not do badly for two years' work. In addition the Government furnished £11,353 .. 3 .. 2 to repay his expenditures.

## Chapter VII

## EXPERIENCE IN ENGLAND

Attack on fleet at Boulogne. Torpedoing of Dorothea (1805). Effect of Trafalgar on Fulton's work. Copies of "Drawings and Descriptions." Intent of government not to proceed with the submarine. Correspondence with Lord Hawkesbury and Mr. Pitt (1804). Commission of investigation appointed. Decision adverse to a submarine. Nevertheless Pitt signs contract.

Two years had passed since the execution of the contract, during which time Fulton remained actively at work for the Government. He made an attack on the French fleet at Boulogne by means of his bombs but without success. He explained the cause, and probably correctly, but nevertheless he was charged with failure. Then he repeated the experiment with altered details in the mechanism and blew up a brig called the "Dorothea" on October 15, 1805, in the presence of Pitt and other officials. Success was again in sight, but only to vanish as quickly as it appeared.

Six days after the destruction of the "Dorothea" came the great event that made secure England's control of the sea. On October 21st, Nelson destroyed the combined French and Spanish fleets in the decisive battle of Trafalgar. After that England had no need of submarines, torpedoes or Fulton. Her ships of oak were absolutely supreme, and she saw the force of Lord St. Vincent's criticism.

The parallel between 1805 and 1922 is close. Then as now, and for similar reasons, England was, and is, opposed to the use of submarines in warfare.

Mention was made above that the "Descriptions" he left in England had been copied. Fulton did this with

nearly all his important papers, and the copies were in manuscript, not letter press tissues. In this case the copy is in the possession of Edward C. Cammann, Esq., a great grandson, and bears several dates. To the main recital are added 41 pages of the same size paper, of which 12 pages contain material entitled "London August the 16th, 1806. Notes on observations of the Arbitrators, Particularly of Capt. Hamilton and Sir Charles Blagden in answer to objections stated by them." The balance are taken up by letters to Lord Grenville dated September the 3rd, and "Further considerations on the instantaneous and clockwork bombs."

Before leaving England he also copied the drawings. These copies are on thin paper and are obviously tracings of the original "Drawings" that are on bristol board. In the course of time the tracings have become separated from the manuscript copy and are now the property of the New Jersey Historical Society at Newark, N. J. The latter plates are signed and dated 1806, whereas the originals bear date 1804. In the eleventh clause of the contract Fulton stated that he had "deposited the drawing and plans of his submarine scheme of attack in the hands of a confidential friend with the view to their being delivered to the American Government in case of his death." As it is unlikely that Fulton made two sets of carefully prepared drawings in 1804, the evidence is presumptive that the plans above referred to are the ones that have recently been found in England and that form the basis of this book. The American Consul at the time, especially as he was a man of character and responsibility, would be the natural depositary for papers of semi-official character. Of the original drawings, numbers 1, 6, 8, 10 and 11 are unfortunately missing. Through the courtesy of the Historical Society their copies have been used to make good the deficiency.

By the spring of 1806, Fulton had no misapprehensions as to the intent of the British Government. It was quite clear to him, as his letters show, that the authorities had decided not to use his devices for either submarine or torpedoes. It is also likely that he had received an intimation that his salary would be discontinued. Professional recognition was to be denied him, and unless he was also willing to forego hope for substantial pecuniary recompense he must have recourse to the arbitration clause of his contract.

Whether the necessity for such action came as a surprise to Fulton, one thing is clear from his letters. In spite of a liberal contract, carrying a generous salary and full allowance for his disbursements, Fulton had not been happy from the very first. He was impatient at every delay and intolerant of every suggestion. He would not, or could not, understand that the progress of government affairs is always slow, and that no government official, no matter how exalted his rank, could make decision promptly without reference to his professional advisors. The similar errors in judgment that he committed in France he repeated in England.

His letters, of which he wrote many, are from the very first couched in terms that it must be confessed are impatient, dictatorial and fault-finding, and never in that diplomatic and conciliatory form that has always been considered proper when addressing high government officials. This is particularly true when one remembers that he was corresponding with men holding office under George III, a period when those directing government did not hesitate to arrogate to themselves full autocratic powers and to regard all who were not in their own class as far removed inferiors. From others than their associates they were not inclined to accept dictation or brook carping criticism. That the several ministers with whom Fulton dealt tolerated the

tone of his communications and overlooked his demands and complaints, is most striking testimony of the high regard in which they held his devices. Just so long as France was in a position to threaten their power on the ocean they intended to keep and hold Fulton safe.

Although on May 23rd he had submitted his proposals to "Mr. Hammond," nevertheless immediately afterward, and before his proposals could be examined, he decided to go over Lord Hawkesbury's head and seek a conference direct with the prime minister. On June 6th, he wrote the following letter in which it will be noticed he explained the connection between his right and assumed names:

Robert Fulton known by the name of Francis Author of Submarine Navigation to Mr. Pitt.

Sir What I have to say on this subject and its prompt effects I hope you will find interesting, it possibly may be of the utmost importance in Seconding your Views if Soon adopted; it is at least of some moment that you feel a conviction what I propose to demonstrate are facts and that your mind trace over the political consequences I beg 20 minuets conversation with you as soon as possible.

I have the honor to be your most
Obedient R Francis

Storeys gate coffee house June the 6th 1804

Before Pitt had reasonable opportunity to arrange for an interview, or Lord Hawkesbury to name a commission of investigation, Fulton wrote "Mr. Hammond" a tart letter of complaint just one month after he had arrived in London:

Storeys Gate coffeehouse June the 22d 1804

Mr. Hammond

Sir

The first day I had the pleasure of Seeing you I promised you candor, and Should time make me more known to your government they will find frankness one of the leading lines

of my character, Now I candidly declare that having been here 5 weeks in some degree like a prisoner, and at present as much in the dark as on the day of my arrival such a state of Suspence begins to grow extremely unpleasant

The flattering and I believe candid promises of the late ministry induced me to come to this country and as yet I do not repent it but I beg to be informed if the present ministry mean to act up to the spirit of Lord Hawkesburies letter to me or what do they desire of me?

On my part I came here to acquire wealth by communicating a new System to government which I do not hesitate to Say is to them more than one thousand times the value of any sum I may receive. I have pointed out the most Simple and honorable mode of determining whether this ascertion is fact, by means of a committee of scientific men, and now I beg to know will government agree to such decision and when Shall the discussion commence? or do they wish to decline all research into this business you will have the goodness to give me their ultimatum when I shall have the honor to see you on tuesday

Believe me impressed with the highest
respect for you your most obedient

Robt Francis

As a matter of fact, in spite of Fulton's impatience the government acted with commendable, if not extraordinary, celerity. A commission was named and it reported before June 27th, because on that date Fulton addressed to " Mr. Hammond " a review of their findings. The commission was composed of Sir Joseph Banks, President of the Royal Academy, the Hon. H. Cavendish, a well-known chemist, Sir Home Popham, Major Congreve, an inventor of projectiles, and Mr. John Rennie, one of England's leading engineers. Dickenson thinks that possibly the first two were suggested by Fulton. The subjoined letter to " Mr. Hammond " seems to contradict this, because in it he complains that they " passed judgment " (adversely) " without even desiring to have the details of operation."

Had two of the five members been representing Fulton it is almost certain that they would have insisted on his being invited to be present to explain his device. As it was, all they had were certain proposals made by a "Mr. Francis."

Storeys Gate coffeehouse June the 27th 1804

Mr. Hammond

Sir

I have examined the 5 Articles of the commission they seem to admit the possibility of making a Submarine Vessel but they conceive it impossible to use it to Advantage, hence recommend that it Should not be adopted,

It possibly may be good policy in government not to adopt the whole of my system, it merits however their serious consideration whether they cannot draw great advantage from using part of it without risque to themselves, But that the whole of it is practicable and even in general cases easy executed can be proved, hence I am somewhat surprised that 5 Gentlemen of science Should pass Judgement on a work which rises out of the progress of improving Arts, without even desiring to have the details of Combination or operation, without having evidence of what has been done; and Judging from thence what maybe done, thereby leaving government as much uninformed of the truth and probable consequences of Submarine navigation as though I had never arrived; this is not the interest of Government your interest is to know the whole truth that you may see, clearly what maybe hoped or calculated upon from this discovery, I shall be happy to have an interview with Mr. Congreve, Mr. Cavendish and Sir home popham, but I can say little more to those gentlemen than endavour to convince them that the true Interest of Government, is to go into a thorough examination in order to arrive at truth; which examination I will put on the most liberal and honorable terms, you will have the goodness to desire a meeting as soon as possible

I have the honor to be yours
with respect

Robert Francis

The suggestion to have a conference with Major Congreve, Mr. Cavendish and Sir Home Popham was referred to Mr. Pitt and was objected to by him, as is shown by a memorandum among Fulton's papers:

June the 28th 1804

Saw Mr. Hammond this morning at 1 who informed me Mr. Pitt wished me to see the whole of the commission least it should offend Sir Joseph Banks & Mr. Rennie, Agreed

If Fulton was impatient he was also indefatigable. However much one must condemn his lack of tact, one cannot help admiring his persistence. He wrote not only to "Mr. Hammond," but also to Sir Home Popham. In spite of the fault-finding tone of Fulton's letters, he and Sir Home Popham apparently remained friendly to the very end. As will have been noticed, it was the latter who witnessed the contract and perhaps was instrumental in arranging for its execution. When Fulton found that the commission would not come together again, he wrote to Sir Home a long letter under date of June the 30th. The letter is too long to quote fully but the following extracts will show its general nature:

To Sir Home Popham

Sir

Were the Gentlemen who reported on my proposals to meet again I Should have addressed them as a commission. As that may not be the case I shall be happy to have some conversation with you on the subject of submarine navigation .....

If Gentlemen were Actuated by what the conceived Patriotism in rejecting every investigation of this Subject in order to keep it in oblivion as much as possible I conceive the measure not effectual, what has been proved And is Supported with Energy, cannot be consealed but by the consent of the Author; but perhaps this was not the motive, for deciding without evidence .....

Now Sir permit me to make some observations on the real patriotism connected with this business

If what I Say of submarine navigation and attack be true, if fleets can be destroyed by this means without any human foresight preventing it; is it not important that Government should Know how and by what means, if on investigation you should found it all false and visionary would not the infirmation be pleasing to government and cost nothing? If true is not the wise policy to take amicable measures to prevent it doing any injury to this country. Suppose the decision of the commitee should necessitate me to seek fortune else where by disclosing my system it might fineally appear that such a decision was the most unpatriotic act a citizen could commit, Sir I give you my honor I have come here with the most friendly disposition towards the government And I have not one sinister feeling the interest of this nation is not to adopt the submarine vessel they government aught to know what it is and its probable consequences .....

When he speaks of the most friendly disposition towards the government, it is interesting and perhaps amusing to recall that in 1798 he wrote to Barras, then the guiding spirit of the Directorate, urging the destruction of British ships of war, saying: "Le commerce énorme de l'Angleterre, ainsi que son Gouvernement monstreux, dépend de sa marine militaire." Times had changed!

To "Mr. Hammond" he wrote begging the latter to persuade "Mr. Pitt to name one person *in whome he has full confidence,* to treat or arrange with me."

Fulton perhaps felt that the action of the commission was not intended to be final and therefore it was for him to suggest other ways for passing on his devices. If so, he was justified by the fact that in spite of the adverse report of the commission of which Mr. Pitt must have been informed, the latter accorded Fulton an interview on July 20th at which Sir Home Popham, who had just voted against the submarine, was present. An account of this interview Fulton committed to paper.

20th of July 1804

Breakfasted with Mr. Pitt at his country house Near Putny common, Sir Home Popham only present Lord Melville expected but did not arrive, after my being Introduced Mr. Pitt demanded of Sir Home if he and Mr. Francis had agree'd on terms Sir Home replied in the affirmative and told Mr. Pitt his perusal and Signature were only wanting. he then read and Signed the papers, delivering them to Sir Home, with orders to call on Lord Melville for his signature,

At Breakfast some general principles of Submarine navigation and mode of attack explained, which appeared to give pleasure; and make a Strong impression. When Sir Home Popham went into an ajoining Room, Mr. Pitt, remarked that this is an extreordinary invention which seemed to go to the distruction of all fleets; I replied that It was invented With that View, And as I had no design to desceive him or the government I did not hesitate to give it as my opinion that this invention would lead to the total annihilation of the existing System of Marine war,

But in its present state of perfectionment Said Mr. Pitt those who command the seas will be benefited by it while the minor maritime powers can draw no advantag from what is Now known, Answer, true unless plunging or submarine Vessels were introduced into practice; that it probably would be some years before any nation could bring to perfection such a Vessel, that it is not the interest of the British government to use such Vessels that consequently there was not at present much danger to be apprehended from that part of my System; at all events there would be, time to fit future politics to future circumstances, if at present the french preperations can be destroyed by Submarine attack, it will convince Bonapart and the whole world that frenchmen never can make a descent on England for any future fleet prepared by them may be burnt in like manner —

Little more passed it was agree'd to make the Submarine attack on Boulogne as soon as the engines could be prepared, returned to town with an appointment to meet at the same place on the following Week,

From the above it will be seen that Fulton and Sir Home had come to an agreement between June 30, the date of Fulton's letter, and July 20.

While at work on his submarine he did not permit his political ardor to cool. He has left a copy of a letter about 2600 words in length written " to the right Honorable Lord Viscount Melville," dated London, Jany the 20th, 1805, giving his " Observations on Bonaparte's pacific Communications." This long letter is in the flamboyant style that Fulton used when writing on political topics. After dilating upon economies that would flow from peace and how such savings from war disbursements might be turned to establishing canals, iron works, manufactures and improving agriculture, he speaks of Napoleon:

Humanity would commend the Man, who turned his talents to such usefull works provided he should use the fruits of it humainly, but it is a question whether, Bonaparte would do So, his insatiable ambition and extravagant Ideas, do not warrent so much confidence in him, Raised from nothing by military talents and a combination of extriordinary events, he is intoxicated with success, adulation has become his daily food as necessary to his happiness as high seasoning to a vitiated appetite, his mind is perpetually working on schemes, which he thinks will give great Eclat, he seeks to be ranked by the future historian above Ceasar and Charlemagne, his principle is that future ages, never take into consideration the miseries which accompany war, they only listen to the brilliant actions of the Chief .....

## Chapter VIII

# NEGOTIATIONS WITH CABINET

Fulton begins to have doubts of accomplishment (1805). Correspondence with Mr. Pitt and Lord Castlereagh reciting his contract, rights and claims. Pitt dies (Jan., 1806) and Fulton begins anew with Lord Grenville and Lord Howick.

By midsummer of 1805, Fulton was not making the progress that he had expected, and again we find him writing letters that could not have been helpful in advancing his cause.

Sackville Street Piccadilly No 13
July the 18th 1805

To the Right Honorable William Pitt

Sir

I have waited till you were releeved from the fateague of attending Parliament before I would urge you on my particular business, on which I have written to Lord Barham twice without an answer, which with other circumstances have led me to believe that government do not intend to prosecute my system of attack Whatever may be their decision it is interesting for me to know it As I have other and previous engagements of much magnitude which call for my attention, and do not warrant my loosing time; hence I hope you will have the goodness to mention an hour when I may have the honor to wait on you that a plan of Acting may be arranged or the business as relates to me put into such a train as to be speedily and finally setteled

I have made the machines and exhibited to Sir Home Popham all that I know of them; the mode of using them and their effects, and if it is thought proper to use them; it can be done as well without my aid as with it As to the submarine Vessel my opinion ever has been that it would not be good policy in this government to introduce it into practice, consequently you will not want me to construct one, But I have all the

drawings to Shew that everything which has been said of it is practicable and which drawings *according to contract,* are to be delivered to such persons as you may think proper to name

Under these circumstances I wish to sail for America about the first of September, I Shall therefore hope that you will have the goodness, to appoint an early hour when I may have the honor to wait on you

I have the honor to be your most

Obedient ROBT FRANCIS

Before the year was finished the tone of his letters became more bitter. He was no longer giving the government advice upon how they were to treat Bonaparte, but was deeply engaged in fighting for what he considered his own rights. The stilted style gave place to a more simple and direct form, in which he made no attempt to disguise his irritation as is shown by two letters written to Lord Castlereagh:

London
Ibbotsons hotel Vere Street Oxford Road
December 13th 1805

Lord Viscount Castlereagh

My Lord

I have the honor to send you reflections without disguise with what I conceive a fair and honorable proposal for a final settlement with government you will have the goodness to consider them and let me have the honor of your decision as soon as possible

With all respects I have the honor
to be your Lordships most Obedient

ROBT FRANCIS —

London December the 13th 1805

Lord Viscount Castlereagh

My Lord

At various times I have been necessitated to say much on the importance of forming the Submarine mode of warfare into a regular and permanent System, As there is now full proof of the powerful effects of the carcasses, and the great execution

which maybe done with them, a well organized mode of acting should be adopted,

System in this business is the true and best Interest of government, I must also beg leave to state that in System, I have a great and important Interest, for without it there is little hope of my acquiring the emolument from my invention which I have a right to expect,

When I discovered this mode of destroying ships of war, I considered it as the basis of an ample fortune, And every experiment I have made has confirmed me in my opinion of its immense importance, and my high interest In it, Therefore while I frankly give you my opinion on what I conceive the best interest of government I must be excused if I begin to insist on what I conceive my personal rights

Lord Melville with whome I contracted was Very friendly to my enterprise and I have now no doubt would have wrought it into a form to produce the greatest possible effect, Since his leaving the Admiralty I have waited from month to month, hoping Lord Barham would follow Lord Melvilles measures, but I have reason to believe he disapproves of the whole plan or is indifferent to it which is the same thing in effect, however as to my private Interest and the situation In which I Stand In this country I consider that of little consequence, though it may be of some importance to the nation,

My contract states a certain reward for every Vessel of an enemy which shall be destroyed by my engines in 14 years and His Majesty's Dockyards and Arsenals are to furnish me the necessary means of applying the carcasses to the destruction of the enemy hence if they do not give me reasonable and efficient means, government do not fulfill their part of the contract, the enemy cannot be attacked nor destroyed however good and simple the engines may be, and my time is consumed to no purpose;

As a Neutral in this country I cannot have a command so as to direct my own enterprise, nor do I desire it nor have I a right to press my plans and opinions on the Admiralty, but I have a right to convert the result of my studies to my own emolument And having demonstrated their certain effects to the conviction of every reflecting mind I cannot undertake to contend with opinions or prejudices nor wait the indeterminate time which maybe necessary to produce a conviction of their utility to this country, I must therefore in justice to myself

and in conformity to all my engagements with this government beg leave to state my final resolution, The Submarine mode of warfare must be organized so as to render it effecient, or I must abandon it and direct my attention to other pursuits equally Interesting to me, The principles on which I came to this country were changed from the first week of my arrival I came by the invitation of Lord Hawkesbury to satisfy ministers as to the truth of whether I had or had not invented a destructive engine which might be wielded, either for or against the fleets of this country, and on proving that the engine has powers superior to the methods at present in practice, I was to receive an adequate reward, leaving government to use or bury the invention in oblivion as they might think proper,

After what has been done I hope that the power of the car casses, and the certain annihilation which must be the consequence of their right application will not be doubted, arrangement and ordinary courage are only wanting to produce the most brilliant success, and were it prosecuted according to the terms of my contract, I should acquire an immense fortune, the destruction of 30 Ships of the enemies line would entitle me to half their Value or more than a Million Sterling, hence were the System pursued to the annihilation of the enemies fleets, and it should be practised to their annihilation or abandoned such would be my reward, but I have no such Ambitious Views, tranquility and a much less sum will content me

I have now directed the construction of a store of engines, shewn their incalculable effects and the simple mode of using them, arrangement time and perseverance are only necessary to destroy every Ship of the Enemy, but as in this part of the business I can be of no use I do not at present see that I can be of any further material service In this system of warfare,

I therefore propose as the most equitable arrangement between his Majesty's Ministers and me to revert to the principles which brought me to this country and finally settle with them,

Before I came to this country Ministers were desirous of knowing whether my invention was of a kind to be feared this has been proved in the affermetive, they have possessed themselves of it, may use it as they think proper and Averted all danger which might be apprehended this consideration alone is suffecient to justify ministers in granting me the terms which I shall propose and which being small compared, with

the prospect of emolument before me will be infinately better terms for the nation than my existing contract

My Lord in making this statement I beg you to be assured that I am nowise discontented, with what has passed nor with the time lost, It has been caused by the natural *Suit* of Idea and demonstration necessary to open the mind to a new subject. And although I feel a high sense of my independence of the immense and incalculable consequences of my discovery, of the right which I have to dispose of it as I think proper and convert it to my own emolument or Ambition, In doing which I might change the whole politics of this country and even Europe * yet on a fair and honorable arrangement with this government there is nothing to be feared from me, I am perfectly satisfied with the conduct of Lord Melville Mr. Pitt and your Lordship but Seeing that you have prejudices to combat and many difficulties to encounter, feeling also that I can be of no further use, and having other and previous engagements which I must In honor fulfill I wish a final and equitable settlement and on this business I beg to have the honor of seeing your Lordship and Mr. Pitt as soon as possible,

I have the honor to be your
Lordships most Obedient

Robt. Francis

* This will appear strong and extraordinary assertion for a simple individual, but if necessary I will prove such to be the natural consequence of the invention if prosecuted to the extent of its powers with the means which I possess. I alude to the Submarine boat or Vessel

The following are the terms I propose the Sum and Conditions are Similar to those Specified in my letters sent by the agent of government from paris to Lord Hawkesbury

Terms

That for leaving France and coming to England I Should receeive ten thousand pounds

That for clearly demonstrating that Ships of war can be destroyed by my engines with more ease and less risque than by any method now in practice I demanded th Value of one first rate line of battle Ship or *one hundred thousand pounds*

With this demand the following Ideas were associated, First that I Should not exersise or be the cause of exersising this invention against the fleets of great Britain, Second that by not Shewing the Mechanism of the Submarine boat and adopting only a part of my plan, this government might draw advantage from it Government can now Judge whether it is important that I should never be the means of using this invention against the British marine whether it is their interest to grant these my original terms and whether this proposal is extravagant considering the demonstrations I have made and the power I possess to render my invention Infinately more productive, In this proposal as it Stands I See that Ministers Will have one difficulty which is a Security that I Shall not be induced to use this invention against the british fleets after having receeived the sum Specified, there is but one way to give such security that is to put it in my power and make it my interest to remain tranquil or occupy myself in other pursuits equally honorable and important to my country for this purpose I propose to receive Sixty thousand pounds and my present Salary of two thousand four hundred pounds per annum for life, the Annuity to be forfeited if I break the treaty — I have already receeved ten thousand to be considered part of the above Sum,

My Lord I conceive this proposition fair you have the Interest of England to consider I have my own, I love tranquility and science in my chamber, As a man of honor my principle Is to fulfill my part of all my engagements before writing this letter I have well considered the subject on all its bearings and made up my mind to the general principles here proposed

And I assure you that great as this demand may appear to be I am not much interested in its success, for by agreeing to let my invention lie dormant I feel that I abandon a Subject in which there is the most Philosophic and honorable fame and perhaps the interest of my country which is dearer to me than all considerations of wealth, However I hope America And England will so well understand their Mutual Interest, that it will not be necessary for me to introduce my Invention into practice for our own defence And I have no desire to use it to the Advantage of any other Nation

I am Sir & & &

R Fulton

Fulton was not content to submit his demands to Lord Castlereagh only, but as on other occasions he went over the head of his correspondent and appealed to higher authority. In this case he forwarded a copy of the letter with some additional thoughts to the Prime Minister, Mr. Pitt:

London Jany 6th 1806

Mr. Pitt

Sir

That you may have an opportunity before you come to Town, to Judge of what I conceive my rights And the governments Interest, I have taken the liberty to send you a Copy of my letter to Lord Castlereagh you will no doubt at the first thought consider my demand great, but there is one reflection which Usually accompanies all negotiations, whether between Nations or Individuals, that is the power which each possess to support certain claims, Now in this business I will not disguise that I feel the power which I possess which is no less than to be the means if I think proper of giving to the world a System which must from necessity sweep all military marines from the ocean, by giving to the weaker maritime powers Advantages over the stronger which the Strong cannot prevent, this power I felt before and when I came to this country but I did not think right to insist upon it nor could I expect ministers to believe it till I had given them sufficient demonstration This is a power which is not possessed by even Bonapart, It is concentered in me and two friends who are governed by my success in this country

Hence on Such power I have a right to set what price I think proper, but I hope I am not of a disposition to abuse the advantages which the Arts have given me either by unreasonable demands or any illiberal act. In my present terms I have not raised the Sum first proposal to Lord Hawkesbury; And It must be observed, I did not come here so much with a View to do you any material good as to Shew that I had the power and might in the exersise of my plan to acquire fortune, do you an Infinate Injury, which Ministers if they thought proper might prevent by an arrangement with me, —

I did however Zealously attempt to be of Service, I have proved that Infinate good or Injury may be done. I have

written to Lord Barham two letters without receiving any Answer. I can easy conceive he has not had time to consider the position in which I Stand nor my Invention in all its consequences and might not think An Answer of any importance, However it is time that he Should See it in all its consequences and Judge of the propriety of a fair and honorable arrangement with me,

Although Sir you will be overwhelmed with business on your coming to Town yet I hope you will not let this escape your memory

I have the honor to be your most
Obedient and Very humble servant

ROBERT FRANCIS

The Right Honbl
William Pitt Bath

The letter to Lord Castlereagh is in the best form of any of Fulton's communications to the government in spite of the thinly veiled suggestion of a threat in the closing lines, but Lord Castlereagh must have been amused to learn that the foreign inventor, then without fame or position, was " perfectly satisfied with the conduct of Lord Melville, Mr. Pitt and your Lordship." He, whose conduct was approved and from whose decision Fulton practically appealed in advance without time being given to render it, was a most important character in British politics at that time.

Lord Castlereagh lived between 1769 and 1822. He was the son of the Earl of Londonderry, and as his father was still living during the period under consideration, the son was known by the courtesy title of Viscount Castlereagh. Instrumental in securing the union with Ireland he forfeited the King's support by urging emancipation for Roman Catholics, and to such an extent that the resignation of the Pitt government was forced. Castlereagh accepted a position in the new cabinet and on Pitt's return to power in May, 1804, continued in office, and in 1805 became Secretary for War.

It was to that official, therefore, that Fulton wrote the above letters.

On the 23rd of January, 1806, Pitt died and was succeeded in office by Lord Grenville. This necessitated new approaches by Fulton. Charles Grey became First Lord of the Admiralty in the ministry then formed. His father, Sir Charles Grey of Howick, had served as a British General in America during the revolution and was raised to the peerage as Lord Grey of Howick in 1801. In April, 1806, he was created Earl Grey, when his son adopted the courtesy title of Lord Howick. Fulton's letters, therefore, to Mr. Gray (misspelled for Grey) and to Lord Howick are to the same person.

During February, Fulton recommenced his efforts for a settlement by writing Mr. Grey. At the same time he enclosed copies of letters previously sent to Mr. Pitt, assuming that Mr. Grey, being new to the office, it was necessary to acquaint him with what had gone before.

Ibbotsons Hotel Vere Street Oxford
Road Feby 22d 1806

Mr Gray
Sir

In my letters to Mr. Pitt the copies of which I had the honor to present you there are some Assertions on the powers of submarine attack which men in general will be inclined to doubt, few men will believe that any plan can be carried to Such perfection as totally to annihilate the present system of Military marines and maritime war. And I presume most men in my Situation would endavour to conseal this part of the Business from every member of a Government the consequence of which depends on her marine.

But as I have been invited to this country to give Ministers full information on the nature and powers of submarine Attack, I have been disposed from the first candidly to explain every principle and mode of practice which Occured to me on the subject, And then leave Ministers to Judge for themselves Whether fleets can be destroyed by my means, and how much of my System they may practice with safety, or what part of

it conseal from public knowledge I therefore conceive it the most prudent and prompt measure, first to go into a full and Satisfactory examination of the principles of Submarine navigation and attack, their practicability and consequences and from such investigation judge of what this nation has to hope or fear from the System; and on what ground I found my Claims; such a mode of proceeding will place this Subject clear before the mind I therefore Advise that you will have the goodness to Invite such of your friends as you conceived best acquainted with Mathematical and Physical Subjects I will meet them and explain the whole Machinery and mode of operating and from their decision ministers can Judge how to Act This I conceive necessary for every reason, first to Obtain a clear knowledge of facts; Second to Judge of the policy of practicing my System; and third whether My deamnds are reasonable; and which demand, I presume must be setteled by the privy council —

To go into the investigation it is not Necessary to have Many persons 3 or 4 will be Suffecient for the less number who become acquainted with the Mechanism of the submarine Vessel, the less it will be talked of or become publicly known,

I hope Sir you will form such a committee as soon as possible and when formed favor me with a line, —

I have the honor to be your
Most Obedient and Very
humble servant

Robt Fulton

P. S. Would not Lord Sidmouth Lord St. Vincent, Mr. Windham and Yourself Suffice for the investigation?

The Right Honorable
Charles Gray
First Lord of the Admiralty
& & &

The duties of new office probably occupied Mr. Grey's time to the exclusion of coming to a settlement with Fulton. At any rate the latter writes again:

March the 17th 1806

Mr. Gray
Sir

After the Various changes of Ministers and Measures which have kept me in this country for near two years and the time fast approaching when I must Absolutely sail for America you will excuse me for Urging that my arrangements with this government may be finally Setteled. In the copies of my letters to Mr. Pitt which I had the honor to present you my Ideas of the powers and Consequences of Submarine navigation and Attack are fully explained and without disguise the question therefore between government and me appears to be Simply this have I proved Sufficient to merit the 40,000 mentioned in the contract? if there be Still doubts on this point it is Stipulated to be setteled by arbitration this is Justice founded on the contract. but added to this Is it not the Interest of government to finally settle with me and then use my mode of attack as they think proper,? I beg you will have the goodness to mention an early hour when we may have a conversation on this subject and fix a plan for a just honorable and prompt Settlement, let it be morning or evening or any period most convenient to you when there may be suffeceent time for ample Explanations,

I am &
R Fulton,

Fulton's impatience always inclined him to correspond simultaneously with more than one official, and particularly so if thereby he could reach one higher in authority. Although his negotiations begun through Lord Howick were apparently proceeding satisfactorily, he forestalled a submission by the latter to Lord Grenville by writing to the latter himself. As this letter gives a review of Fulton's claims and forms the basis for arbitrators who were subsequently appointed, it is of peculiar interest.

## Chapter IX

## FURTHER CORRESPONDENCE

Demand for arbitrators. Further correspondence with Lords Grenville and Howick.

London May the 5th 1806

To the Right Honorable
Lord Grenville
My Lord

Lord Howick will have a conversation with your Lordship on the mode of finally setteling with me, As the papers which I have from time to time written to Successive Ministers and to his Lordship may not be at hand at the time of such conversation, And as a right understanding of submarine Navigation with all its probable consequences Is I conceive of much importance to this government I beg your Lordships attention to the following observations which shall be as concise as possible, And I hope it will be admitted by your Lordship that whatever may be the effect of any Scientific discovery on the interest or politics of this country, It is better his Majesty's Ministers should be acquainted with it than remain uninformed, And I conceive Investigation the more necessary when it is considered that discoveries in the Sciences have from age to age changed the whole art of war and the politics of nations That being slow in the operation their consequences cannot be traced by ordinary men, who being creatures of habit and Guided by existing things consider new discoveries as Visionary or trivial Such were the Ideas of the Inventions of printing, gunpowder and the Mariners Compass had their authors Shown their consequences they would not have been believed by their Contemporaries

So my Lord when I say that I have discovered a mode of attacking Ships of war which if prosicuted to its Ultimate powers and rendered fameliar to all nations must from necessity destroy the existing system of military marines and alter the whole politics of Europe I do not expect to be believed by any but men of penitrating Judgement and Sound Sense nor do I ex-

pect them to believe me untill they have see the whole of the engines and had ample proof of the simple mode of using them and their certain destructive effects Now my Lord if this be a truth it is certainly important to know it, if it be false the conviction that it is so will be equally important for then there will be nothing to guard against, hence to place this Subject in its true light I have proposed to Lord Howick to form a committee compossed of Your Lordship Lord Moria Lord Sydmouth Lord Erskin Mr Fox Mr. Windham Sir george Shee and Alexander Davison Esqr. the members of this committee are all friends to government to them I will exhibit all the machinery and modes of using it and Reasoning from Experiments already made endavour to Shew what may be done leaving to the committee to Judge whether my preceding assertion is true And for Such communications I make no demand, but Should the committee find my assertion supported by facts It will be acknowledged that I have a high Interest in this produce of my own mind and that I have a right to prosecute it to the acquirement of fortune or fame, I have mentioned to Lord Howick my Views on fortune, the committee will Judge whether it be the interest of government to acceed to my proposal and whether the terms Specified are the best security which I can give that this subject shall not be further prosicuted by me My Lord I beg you to be Assured that I have every disposition to act in the most liberal and honorable manner towards this government At the Same time I must Acknowledge that I never will abandon my private interest Till satisfied by specific Stipulations and I hope my Lord that this fair proposal to investigate all the principles and this undisguised mode of Acting will inspire your Lordship and Every member of the committee with a confidence that what I agree to Shall be scrupeleusly and honorably adheared to. Should your Lordship require any private conversations on this subject I shall be happy to wait on you at an appointed hour.

I am my Lord your Lordships
Most obedient and Very humble
Servant

Robert Fulton

P. S. Just as I was finishing this letter I was informed by Mr. Tucker that Lord Howick and your Lordship had decided not to have any thing to do with the submarine boat My Lord

I never wished this government to introduce such boats into practice But it is Stipulated in my contract that if for any reason government do not think proper to practice my mode of war Arbitrators Shall be appointed and if it appears to the majority that enemies Vessels can be Destroyed by my means at less expence and Risque than by any method now in practice I shall receive 40,000 £ hence as the Submarine boat makes part of my System it must come under the consideration of the arbitrators.

Previous publications dealing with this portion of Fulton's career have inclined to the view that consideration of his plan for a submarine boat had been discarded soon after he came to England. From the postscript to the above letter it appears that Fulton was not informed that the submarine had been rejected until May, 1806, or two years after his arrival in England. Undoubtedly it was held under serious and secret consideration. Even if Fulton did not construct such a boat for the British Government, the latter reserved the right so to do until it was decided to drop all thought of adoption, or even of further investigation of any form, of under-water attack.

On May 14, Fulton again writes to Lord Grenville:

May the 14th 1806

My Lord:

Since writing to your Lordship on the 10th Inst Lord Howick has agreed to decide on my Contract by arbitrators, I now beg you Lordship will have the goodness to give orders that my accounts which are with Mr. King may be immediately setteld. They have no connection with the final decision on my contract they have been 4 months moving from office to office and now wait your Lordships decision

My Lord when I was Invited to this country I was led to believe that every reasonable attention would be paid to my demonstrations propositions and claims. I was therefore disposed from the first to do everything in the most liberal and open manner. I have uniformly acted on this principle And I have hoped for equal attention and liberality from each of

His Majestys ministers with whome I may have to act. My Lord mine is no common Case; Tis my Sincere wish and the real interest of this government which I will hereafter explain that everything relative to this business may be setteled in the most friendly manner hoping to have the pleasure of arranging with your Lordship on this principle

I have the honor to be your Lordships
most obedient and Very humble Servant

Robt Fulton

The Right Honble
Lord Grenville

From the above it appears that his previous requests to Lords Howick and Grenville for the appointing of arbitrators had met with a generally favorable response. But sometimes diplomats agree "in principle" and then avoid arriving at a settlement of such inconvenient things as defined details.

There still remained much letter writing, threats and begging before the arbitrators were actually named, during which time Fulton came very near giving public proof that he had lost his temper.

More than three weeks after Lord Howick had informed Fulton that he had decided to submit the contract to arbitration, nothing had been done as shown by the following letter to Lord Grenville's secretary:

London June the 6th
Ibbotsons Hotel Vere Street Oxford Road

Mr. King
Sir

Yesterday Lord Howick informed me that Lord Grenville had mentioned to him two or three persons whome he thought fit arbitrators. I beg you will speak to his Lordship to decide on two as soon as possible which decision becomes urgent in consequence of my being under the necessity of sailing for America About the 10th of July —

That this business may proceed with the least possible delay, and trouble to Ministers I Conceive the best mode will be to

name one person first who with my friend Mr. Davison or Mr McArthur will [first] arrange the terms of the Arbitration bond: then they being arbitrators [proceed] associated to two others [Can proceed] can proceed to the examination of the Machinery the principles of application and a decision on the contract.

I beg Sir to hear from you on this Subject as Soon as possible

I am etc

R Fulton

On June 17th he again writes to Mr. King:

Ibbotsons Hotel June the 17th 1806

Sir

Anxious to Know the progress of my affairs and [conceiving that] conceiving that there can be no objection or obstacle to prevent the immediate naming of Arbitrators on the part of government I will take the liberty of waiting on you tomorrow between the hours of 11 and 12 to have a few minuets conversation on this subject.

I am Sir your most obedient &
Very humble Servant

King Esqr.

Robt Fulton

No reply having been received within two days, his impatience and irritation overcame his control of his nerves and on June 19th, he takes pen in hand to begin the inditing of three letters. Considering that of these letters one is addressed to the chief of the most powerful government then existing, a government that controlled the affairs of the world, another to the member of the cabinet in charge of the Navy, and both written by a man who had been for two years and still was in the employ of the government, they leave unbroken few rules for the proper conduct of official correspondence. At this time Fulton's feelings were like the actions of a series of his bombs — a state of prolonged and violent explosions.

One of the letters is addressed to Mr. King, whose first name Fulton does not seem to know, the second to

Lord Grenville, and the third a covering letter to Lord Howick. The corrections show that Fulton spent some time in composing these communications, a task of no small difficulty in view of Fulton's position and the disturbed condition of his temper. The two dates on the Grenville letter indicate that Fulton slept on it for one night, while the lapse into his earlier degree of disregard of orthography is perhaps further evidence of his emotions. The delay of one day in transmittal saved him, as similar delays have saved others. Perhaps some kind friend came to his guidance on the morrow, or perhaps a night's rest had calmed somewhat his troubled spirit; whatever the reason, according to the footnote to the Howick letter he refrained from forwarding any of the three.

It is not difficult to picture what Lord Grenville's outburst would have been had he received Fulton's letter of June 19th–20th. The man who had not feared to break with the all-powerful Pitt, and who had become premier of England, would hardly have taken kindly to Fulton's ultimatum nor his threat to write a letter to The Times.

Mr. King
Sir

by your silence on my Several letters permit me to say that you have treated me in a most ungentleman like manner; Inclosed is a letter for Lord Grenville which you will please to read and present to his Lordship, by it you will perceive the line I mean to pursue I have more favours to bestow on this government than Ministers will ever bestow on me and I am now about to put that, to the proof should they drive me to such necessity.

I am Sir your most
Obedient R Fulton

King Esq Secretary to Lord Grenville
At the Treasury
June the 19th 1806, London

June the 20th 1806

My Lord

I wrote to your Lordship on the 5th 10th and 14th of May, And to Mr. King on the 30th of May & 6th of June, to which letters I have not received any answer nor assurance, that my [business] Claims on government shall be speedily and honorably setteled. As, time presses hard upon me for for three months past I informed Lord Howick and your Lordship that I should Sail for america In July, I am driven from necessity to urge in the strongest manner that my concerns with governmt may be immediately and finally setteled, hence Should my rights Continue to be treated with silent indifference, the letters which I may hereafter have occasion to write to your Lordship must from necessity be through the medium of the public prints, But I yet hope that so disagreeable an alternative may be avoided And that your Lordship will se the Justice and propriety of immediately naming your Arbitrators and of their immediately proceeding to a discision on my Claims,

My Lord Much [and Silent] experience has made me conscous of the powers of the engines I possess. I am also sensible of my own resources and means of Action I convinced the late Ministers of them they felt them and treated me with that attention Justice and civility which should satisfy a rational man. [And] Since the new Ministry has been formed I have repeatedly offered to your Lordship and Lord Howick to Submit the whole of my Assertions, demenstrations and claims to Men of science and Arbitration by which means [government] Ministers may become acquainted with scientific facts interesting to the nation, and Justice may be done to me, more liberal and honorable terms cannot be proposed, these terms I have a right to demand [them] and My Lord I now do demand them, I look to your Lordship and Lord Howick for prompt Justice I demand it as my right And I never will Submit to [receive] plead for it as a favour

My Lord if I have not before monday next Satisfactory Assurance that Arbitraters Shall be immediately Named on the part of Government And my [Claims] Business [immediately] proceeded upon in a prompt and liberal manner I will on the commencement of next week put this letter in the public prints and proceed to publish such details and demonstrations As will put it in the power of the nation to Judge if my rights,

the Justice of Ministers And the importance of a Subject extremely interesting to [them] every Englishman.

I am my Lord your Lordships most
Obedient and Very humble Servant

ROBERT FULTON

Lord Grenville,
June the 19th 1806

Lord Howick
My Lord

As yet I can neither see nor heard from Lord Grenville nor Mr. King. Inclosed Is a copy of a letter which I have written to his Lordship degrading neglect, to a man in my situation, compels me to take the measures which I have adopted;

I am My Lord your Lordships
Most Obedient [and]

R. FULTON

June the 19th 1806

These three letters not delivered for the
present the following two Substituted,

The two letters that he substituted were addressed one to Mr. King and the other to Lord Howick.

The copy of the King letter, now in the possession of the writer, is dated but not signed. In it he still gave vent to some of the bitterness and threats contained in the letter to Lord Grenville, but in gentler tone. As the censure is not now addressed to Lord Grenville but to his secretary the irritating character is much softened.

Ibbotsons Hotel June the 20th 1806

Mr. King
Sir

Your Silence on my several letters Is a want of politeness and an Injustice which I feel in the most sensible manner I have offered His Majestys Ministers the Most rational and

honorable terms, by proposing to submit my whole plans to men of science and arbitrators if Ministers have not time or doubt their own [power] ability to Judge of the powers and consequences of new inventions how can they expect to arrive at truth or get correct Ideas but through the medium of Men of Sciences, of their own appointment, to refuse such a proposal and what is worse to treat it with contempt is injustice to the nation and to me and is [the] sufficient to sink any man or men in the opinion of the [nation] public. I hope I Shall not be driven to the necessity of appealing to the public opinion on this point but that I Shall have prompt and reasonable attention immediately paid to my claims I hope sir for your immediate answer

The letter to Lord Howick is a model of self-restraint as compared with the violent outburst of the withheld epistle to Lord Grenville:

Ibbotsons Hotel June the 20th 1806

Lord Howick

My Lord

I have not as yet seen or heared from Lord Grenville nor Mr. King nor received any assurance that my business shall be speedily setteled In a thing so Just and Simple as the naming of two Arbitrators why should such unnecessary delays and injustice be [extended to me] exercised toward me? Will Ministers necessitate me to lay my Claims before the public, and force me to such demonstrations and disclosure of facts as must be disagreeable to all parties and of serious consequence to the nation; My Lord I look to your Lordship and Lord Grenville for prompt Justice I demand it as my right and will not Submit to ask it as a favor. I am Conscious of my own Strength and resources I convinced the late ministers of them, they felt them and treated me with Justice attention and civility, I have offered to convince your Lordship and His Majesty present Ministers, of the truth of these powers by submitting the whole to men of Science and Arbitrators Your Lordship has intimated that [you] you doubted your own [capacity] power to Judge of the [power or] effect and ultimate consequences of my Inventions, then how do you expect to arrive at truth but through the medium of men of Science

My Lord this is common sense and [the Nation] Men of sense and the Nation will not approve of any other line of conduct in this Business —

My Lord 3 months ago I informed you that my plans were laid for Sailing to America In July this is still my intention the time is fast approaching And one of the gentlemen who [was] agreed to act As my arbitrater must shortly leave town for these reasons I must [Insist on] [beg Insist] [beg] hope for your immediate decision, and answer to this letter.

I am etc.

R. Fulton

As one reads these letters beginning with the moderate request to Lord Grenville on May 5th, the unwritten matter between the lines suggests that Fulton was not very hopeful of obtaining either a satisfactory financial award or the personal treatment that he felt he was entitled to receive.

## Chapter X

# THE FAILURE OF THE NEGOTIATIONS

Arbitrators appointed. Fulton's presentation of his case (Aug., 1806). Arbitrators decide against Fulton. He makes a last appeal to Lord Grenville, reviewing whole case (Sept., 1806). No reply.

The arbitrators were finally appointed. By that time the increasingly fault-finding note of Fulton's correspondence shows that his fears as to the outcome had become almost certainties in his mind, because he prepared a written brief for submission, the tone of which was far from hopeful. This brief is the "Descriptions" of this book.

When the arbitrators met, those representing the government put sundry questions particularly as to whether any one would risk being caught in the submarine vessel and expose himself to being hanged in consequence of using engines not permitted by the laws of war; the sweeping of the Channel to locate floating bombs; the effect of storms on such bombs, and on the chance of a submarine being driven on shore by a storm. These questions were all met by Fulton in a very logical manner. Both questions and answers are recorded as "Notes on Observations of the Arbitrators Particularly of Captn. Hamilton and Sir Charles Blagden" attached to Fulton's own copy of the "Descriptions."

These same notes show that Fulton made it clear that the plans he submitted to the British Government were so far in advance of anything he had proposed to the French that they constituted new plans. On this point he says:

But, it may be said that my Experiments have been so Public that no part of my plan is now a Secret, I would ask who has seen the Plans and System which I have exhibited to this Committee where is to be found did any gentleman here know them all or any part of them perfectly before I appeared,? It is true there have been Ideas of this subject scattered in the World but the impracticability of any important result has always been attached to them which Idea I perceive has much weight in this Committee.

He urged on the Arbitrators that a list of questions which he sets forth in his notes bearing on the efficacy of his bombs should be submitted to Lord Kieth, Commodore Owen, Admiral Demet, Captain Seccombe, Captain Salt, Captain King, Lieutenant Wm. Robinson and Captain Thomas Johnson of the Nile Cutter. He concludes his appeal to the Arbitrators in the following spirited language:

Now Gentlemen I beg you to believe that I have not taken these measures nor made use of these Arguments to draw from you either Capital or Annuity I am not a Man much governed by a thirst for Money, an honorabel fame is to me a much more noble feeling, But I like truth candor, and Justice to all Parties concerned with me in this Business, I have therefore used these Arguments for the following reasons.

*First,* That at this meeting it is right for me to Shew you in the most striking manner in my power what I conceive your danger and should you not see it as I do and future bad consequences should result to this Country the fault will not rest with me but with you and His Majesty's Ministers, and I shall not have to accuse myself of want of Candour —

*Second,* I have used them to gratify two friends who have been kind to me, and who are more governed by the hope of gain than I am, I have now acquitted myself to this Government and to them, And neither this Government nor they have more to expect of me Therefore Gentlemen should your award not meet their views of Wealth, I shall feel free to act as I think proper And I will take the fame and Consequences of these Engines on myself Abandoning all calculations of a pecuniary kind, and the whole of the Drawings and Papers

here exhibited shall be published within one year with all my Experiments in France and Negotiations with this Government. In fact I will do my utmost to make it a good Philosophic Work and give it to the World. I will then form a Committee of the most respectable Men in America and proceed regularly in Experiments on the large Scale publishing the result from time to time and thus drawing the attention of the ingenious and Enterprising to such Pursuits I shall hope to succeed in my first object that of annihilating all Military Marines and giving liberty to the Seas.

Gentlemen a man who has the candour to give you this in Writing has but little deception or fear in his character and will not abandon so glorious an Enterprise for trifling Rebuffs or mean consideration

At all events whatever may be your Award I never will consent to let these inventions lie dormant Should my Country at any time have need of them, Were you to grant me an Annuity of £20,000 a Year, I would sacrifise all to the safety & independance of my Country, But I hope England and America will understand their mutual Interest to well to War with each other And I have no desire to introduce my Engines into practice for the benefit of any other Nation.

At the end of the " Notes " he adds his own views and a record that the decision, adverse to him, was signed soon after the conference was concluded.

After the Arguments used in the preceding Paper, one would have thought that Justice and Policy would have induced the Arbitrators to hear Evidence on the practicability and probable consequences of such Engines, before they would venture to decide on a Work of Art of so much consequence, they did not however call in one Evidence nor hear one opinion and to my great astonishment the Award was Signed in one Hour after I left the room. Such inconceivable blindness to the Interest of the Nation, and Injustice to me on the part of Sir Charles Blagden and Captn. Hamilton, Induced me to write the following Letter to Lord Grenville and this I did that Ministers may have no excuse to plead that they were lead into Error by their Arbitrators, and again that my two friends may be convinced that I never abandoned their Interest as long as there was one reasonable hope of succeeding to their wishes.

There is a footnote to the copy as follows:

This paper I read to the Arbitrators on the morning of this date and it is deposited with the Government.

In the letter to Lord Grenville referred to above and given at length below, Fulton, it will be seen, states that he had deposited twelve drawings with descriptions of facts in the hands of Mr. King, secretary to Lord Grenville. This is undoubtedly what he means by the statement in his notes of the paper read to the arbitrators having been "deposited with the government." As the drawings were intricate and the paper very long, it is hardly probable that Fulton made three copies including the copy of the paper and tracings of the drawings that he brought home. As neither Mr. King nor the arbitrators had any need for the drawings and paper, it is quite likely that they were returned to Fulton, who left them with Consul Lyman as described in his letter to Barlow and which are consequently the foundation of this book.

The letter to Lord Grenville to which Fulton refers is worthy of reproduction as it is a general summary of his case written immediately before his departure for America. It is his last appeal, and in it he uses every argument that occurs to him.

Ibbotsons Hotel, September the 3d 1806

To the Right Honorable
Lord Grenville
My Lord

As the subject of which this letter will treat is of the utmost importance in as much as it may render the power and independence of Great Britain doubtful and a wrong judgement of it may not only involve the country in complicated evils but attach eternal blame to his Majesty's present ministers of whome your Lordship is one. I Shall hope for your calm perusal and deliberate contemplation of the following facts and observations on the means which science has developed for de-

stroying military marines and in such case what would be the fate of England? There is one suit of thinking which gains easy access to an intelligent mind, and opens the way to a right Judgement on the progress of the arts and the possibility of effecting every thing which is within the limits of physics it is that all science is progressive every year exhibits new combinations and effects, Steam engines, Cotton Mills, Telegraphs, Baloons, and submarine navigation and attack have all appeared almost within our memory, and only Vulgar minds harbour the thought that a Physical possibility is impracticable because it has not already been done, It does not require much depth of thought to trace that science by the discovery of Gunpowder changed the whole art of war by land and sea and may by future combinations sweep military marines from the ocean My Lord I have discovered the means which may produce such an effect, and by ample experiments proved them true, that is I have proved them to a degree which should convince every reflecting and unprejudiced mind, Common minds which cling to the Ideas of forefathers, or established customs are only to be convinced by demonstrations which enter at the Eyes. But if in this case the marine of England must be destroyed to convince the Vulgar of the possibility it will then be too late to reason on the consequences It is to avoid being driven to so dreadful a proof of the power of my engines that I now take the liberty of calling the attention of your Lordship to this Subject, Of the principles of the Engines I have deposited twelve drawings with descriptions of facts and reasonings on them in the hands of Mr. King who I believe has committed them to the care of Alexander Davison Esq$^{r}$. In St. Jameses square which drawings and writings were made for arbitrators who had to decide on my claims under a contract made with Mr. Pitt and Lord Melville.

Of the Arbitrators two Mr. Davison and Dr. Cartwright are of opinion that all military marines may be destroyed by the means which I have Exhibited, how far Sir Charles Blagden and Capt. Hamilton may be of that opinion I cannot tell but resting on their own judgement they never heared evidence nor called for the opinion of nautical men, on the several modes of using the machines, hence Ministers are Still in the dark as to what may be the power Practicability and consequence of such engines.

Now my Lord his Majesty's Ministers cannot do Justice to

the public nor guard their own honor untill they enter into a full examination of my system and take the opinion of many nautical men on the means by which such engines may be used for out of the opinion of the many a right thinking may arise.

I would therefore propose a meeting of His Majesty's Ministers, Your Lordship, Lord Moira, Lord Henry petty, Lord Howick, Lord Erskine, Mr. Fox if his health will permit and Mr. Windham, or any other Gentleman whome it may be thought right to call in, And that before them the opinions shall be taken of Lord Kieth, Admiral Demet, Sir Even Nepene, Commodor Owen, Capt. Seccombe, Capt. Salt, Capt. Thos. Johnson of the nile Cutter, and Lieutenant Wm. Robinson — or such other persons as have seen the experiments and know most of the engines

But should this mode be inconvenient a Committe of 12 Nautical men to examine and report on the plans which I have exhibited, by such means & such only Ministers can do Justice to the public and get a clear understanding of this subject And at Such committee if thought proper I will attend and explain my several modes of attack which will give gentlemen an opportunity to see what means they can devise to prevent your commerce being distressed and your marine by such engines were they in the hands of an enemy and practiced by them against this country,

There are many powerful reasons why such investigation Should be entered into.

*First.*

That if what I ascert be fact and Ministers refuse to take the rational and easy means here pointed out of being rightly informed and my engines should be practiced to the Injury of the commerce and fleets of England the people will not Suffer in silence but attach the whole blame to Ministers for wilfull neglect, therefore in as much as gentlemen regard their future reputation this Subject is of serious consequence to them,

*Second*

If the Engines be harmless it certainly is important to be convinced on this head But will Ministers consent to be convinced on Vague reports and Vulgar opinions which accompany all new Inventions and not calmly sit down with nautical men and by examining principles penetrate into facts — ? My Lord

men of sense must penetrate into all the facts connected with this subject and that His Majesty's Ministers may not have the least excuse, that they have not had a fair and timely warning on what maybe the consequence of these inventions I have Written this letter which I beg your Lordship to Communicate to His Majesty's ministers.

In case of a Committe of investigation I conceive the principle points for consideration and to guard the interest of the nation will be as follows,

*First*

What is the present state of perfection of submarine navigation and attack,?

*Second,*

To what state of perfection is it capable of being brought

*Third*

With such engines in the hands of an Enemy could they injure the commerce fleets and independence of England?

*Fourth*

What is the general opinion of this subject and public knowledge of it,?

*Fifth*

Under all considerations is it policy to practice such engines or to let them be practiced,?

*Sixth*

Is it the interest of the nation that they should rest in their present state and is the public or European mind so little impressed with the use of Such engines that they may rest in their present state of incertitude?

Now My Lord permit me to give you my opinion It has been proved by the most satisfactory experiments, that were an Enemy in possession of all the means which I exhibited to the Arbitrators they could at any time in two months embarrass the commerce of England in the most distressing degree, Or should they think proper to persevere in the practice of such

Engines they could destroy the whole British Marine And I thing it cannot be doubted that The french Emperor whose most ardent wish is to get freedom for his commerce would practice such engines were he acquainted with them, knew the modes of using them and the immense advantages they would give him, That he has not such a Knowledge is in some degree proved by his not making any move in the manufacture, practice or use of them, — For although I made some experiments in france they were always thought more curious than useful and the French never were impressed with the Idea that any advantage could be drawn from what I had done, which opinion prevails in this country at present, The feilure at Boulogne has also spread the Idea that the engines are harmless, but the want of success at Boulogne was in consequence of not having experience, and no defect in the principles of the Engines, hence under these impressions in france and England I believe these inventions may lie silent for many years —

From this I infer that it rests with me and my friends in America whether these inventions shall sleep or or be rendered fameliar to all nations, of this Gentlemen can Judge on investigation

When I was invited to this country a prospect of emolument was held out to me in some degree proportioned to the Value of my engines but in consequence of Lord Melville going out of office, The death of Mr. Pitt the change of Ministers and opinions on this subject the agreement with me has not been fulfilled. Therefore My Lord after Seven Years Labour, Experience Expence and Successful experiment It is reasonable and right that I should convert my inventions to my own use in every honorable way, your Lordship or any other man in my situation would act in like manner, And it is right now to assure your Lordship that I never will Suffer these inventions to rest till I Succeed; But as I have no desire to introduce these inventions Into practice unless my country should have need of them and which I hope will not be necessary as long as England and America understand the true interest of their commerce I still offer my neutrality to this government on Condition that Ministers will meet the Ideas held out to me on coming to England,

This my Lord is placing the security of the Commerce and fleets of England in the Balance against a few thousand pounds

Or an Annuity, which Annuity to be continued to me only so long as such engines are not used by France or any other nation against England, The resting my pecuniary hopes on such conditions is perhaps the best proof which can be given of my conviction that such engines are not yet sufficiently known to be turned against this nation. In Such an arrangement It should be a condition that government Should not permit such engines to be used by any british subject least they should be made known, and turned against this country Or should the present or future ministers use them they should fulfill the terms of the contract for fourteen years as Stipulated in Said contract —

But Should terms to this effect not be Acceeded to I must from necessity place the whole system in such a position as will give it to the world I must also publish this letter, the nation will then Judge whether I have acted frankly And whether Ministers have done Justice to the public and to me,

My Lord having made you this communication your honor and future fame is involved in this question, the high situation which you hold as one of his Majesty's Ministers and your Consequent responsibility to the nation together with my full conviction that what I have here said is not only practicable but easy is the reason I have taken the liberty thus to address you, —

I now beg your Lordship to believe that although this business has been treated in a manner extremely disagreeable to my feelings and I have been much disappointed in not finding the calm and rational investigation which I hoped for, yet I have not one feeling of enmity towards this nation or any one of his Majesty's Ministers I make every allowance for established opinions and Ideas of art which particular education fix on the human mind And my wish ever has been that this subject should be one of reason and not of passion or prejudice And for this reason I again submit it to your Lordship and His Majesty's Ministers before I leave the Country which will be in a few days.

September the 3d 1806

Believe me my Lord impressed with the greatest respect for your high Character and Sense of right

Robert Fulton

The above is an argument. Fulton placed his facts, which were summarized as a series of questions put by him to the arbitrators, or by them to him, and recorded by Fulton in a —

Second Letter

To the Right Honorable Lord Grenville
On Questions, Answers doubts and Considerations at the Arbitration on the powers of Submarine navigation and attack

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After exhibiting the Engines to the arbitrators and the Various modes of using them I put the following questions to the four arbitrators,

*First*

Will the explosion of a submarine Bomb of one or two hundred pounds of powder under the bottom of a Ship of the line destroy her,?

Answer, we believe it would the blowing up of the Brig Dorothea in walmer roads being indubitable proof —

*Second*

Were an instantanious bomb anchored under water and a Vessel to run against it so that the bomb should strike any place under her bottom and explosion there take place would it destroy her,?

Answer, we believe it would,

The power of the engines being thus acknowledged the following opinions were started by Capt. Hamilton as difficulties in the way of using them.

*First*

Where can men be found who will have courage to use such engines, who knowing that were they caught they would be liable to suffer death for using engines not admitted by the laws of war hence what advantages could the enemy draw from Such engines?

*My Answer*

Englishmen have had courage to run four times among the Enemy in Boulogne roadstead with such engines and have courage to do so again Then is it suffecient security for England to rely on that frenchman have not courage to take advantage of dark nights to anchor submarine bombs in the waters near Boulogne where the blockading squaderns usually cruise or near the Black rocks or ushant where the brest Blockading squadern usually cruise or off cape Grinez or half channel over In the waters where British fleets now cruise without a feeling of danger, Should the French Emperor adopt such a system and Issue a proclamation that he would retaliate man for man who would hang a Frenchman? This is for Ministers to consider;

*Second objection of Capt H*

Were ten thousand of such bombs anchored the first storm would drive them on shore and destroy them.

*Answer*

The Buoys to mark shoal water are held in the Same spot in all weathers yet Buoys are of a large Volume and exposed to the shock of the surface of the water which is much more violent than the action ten or fifteen feet deep, therefore if Buoys be held by suffecient anchor and cable, a bomb of not one fortieth of the Buoys Volume may be held also, but to decide on this doubt let a bomb without a lock be anchored in Dover Roads and if it be not found there next Spring I will give up this point.

*Third objection of Capt. H.*

A few vessels with cables stretched could sweep the channel and destroy the Bombs.

*Answer,*

What would be the situation of a commercial country like England were she obliged to lay an embargo on her trade and keep her Ships of war in port till 3,000 square miles of channel were swept once a month,? for while sweeping the Channel in one part, the enemy could be laying down bombs in several places, Suppose for example that the Enemy had anchored

500 or 1000 bombs from the lands end to the humber they who were to sweep them not knowing where they were laid would be necessitated to sweep the whole channel to find them, and another difficulty occurs, for not Knowing the number which were put down who could tell when exactly every one was taken up?

Will Capt Hamilton have the goodness to point out to his Majesty's ministers a certain mode of keeping the channel free from such engines so that the British commerce and fleets may move with all the security and confidence which they at present enjoy*?

---

*When a few hundred of such bombs are anchored it is impossible to clear the Channel of them nor give confidence to navigation till they destroy themselves in the given time for which they were set. That is from one to twelve months. This I know how to do, Therefore the danger may be laid down for any time from one to 12 months and the trade destroyed for any period which the french might think proper,

*Fourth Objection.*

And one to which I believe all the arbitrators Yielded but which they did not give me an opportunity to answer and which I shall now do.

That such a system of Attack would not only destroy English but all neutral commerce, and even the commerce of france that consequently Buonapart would not use it —

*Answer*

When any port is blockaded the commerce of all neutrals as connected with that port is distressed But as the existance of England depends on her uninterrupted commerce while France is more Agricultural, and as france could lay down such engines in the channel so as to distress British commerce yet leave Brest, Bordeaux and the Medeterranian free to her own trade unless England laid down bombs also in which case maritime war would become a war of Bombs in which France would have the advantage in consequence of her trade with Spain and her own frontier, the Question then would be which of the two nations England or France could bear such interruption of their

trade for the greatest length of time and which must finally yield to the dictates of the other In such a contest where everything is to be gained
Nepolion is not of a temper to consult the temporary Interest of Neutrals and it will not be wise in his Majesty's Ministers to risk it.

Questions put by me to Capt Hamilton and which I desired might be put to Lord Kieth, Admiral Demet, Commodor Owen, Capt. Seccombe, Capt Salt, Capt. King, Capt. Thos. Johnson of the nile Cutter, and Lieutenant Wm. Robinson, but which was not done, Consequently an injustice has been done to me and to the Government by leaving ministers ignorant of the facts connected with this subject.

*First Question*

Were you informed that two hundred or more of Such Bombs were anchored in any particular Channel would you venture to Sail through it and among them,
Answer by Capt Hamilton *no*

*Second.*

Had the Enemy three or four hundred good row boats with six or seven thousand men exersised to them and such boats were established along their coast in tens or twenties, from Ostend to Brest with a magazine of bombs at each place how could they be prevented anchoring bombs in such places as would endanger the commerce and fleets of England,?

*Third*

If while sailing in a fleet you saw two or three of the headmost Vessels blown up by such invisible engines would it not destroy your confidence in sailing in such waters?

*Fourth*

Is there any enemy so distressing to the mind of a seaman or so calculated to destroy his confidence as one which is invisible and instantanious destruction and which cannot be avoided but by forsaking the Seas where they are?

*Fifth*

As each bomb will cost 14 say 20 £ and fifty thousand of them may be made for a million sterling is the expence compared with the advantage which is would give France any consideration to prevent the adoption of such a plan as one thousand Bombs would distress the trade for one year — 50,000 would extend their terrors to 50 years,

Now my Lord I appeal to common sense whether the objections started by Capt Hamilton are suffecient security for the great interest which this nation has at Stake against such engines,?

I am my Lord your Lordships
most obedient and very humble
servant

ROBERT FULTON

Sept 3d 1806

Further remarks on the arguments of
Capt Hamilton

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What claim said he has Mr. Fulton to Forty thousand pounds or ten thousand or any other sum from this government, while many british seamen of the first talents do not get half the sum in a whole life of exertions? I myself would feel happy to be so rewarded.

*Answer.*

This is no part of the Question the point for consideration is have I fulfilled my part of the contract? and aught not government In Justice to fulfill their part? But I will now put my pretentions to ample reward in another point of View.

If I cannot exhibit to the world an easy mode of destroying all military marines and consequently the whole political influence of England If I cannot give a clear prospect that by my exertions and the exertions of my friends my plans must in a short time be adopted by European nations at varience with England then I will admit that I have no pretentions to any sum from this government, but for the time already spent and which I consider as paid,

But if science and industry has developed to me a means which by my exertions and the natural order of things must

destroy all military marines and consequently that of England, and if to preserve the power of the British marine undeminished is worth millions to the nation it follows that my neutrality is of as much real value to the nation as the active services of any man in it,. *And I might say of more* for there is not nor ever has been an indivídual in England who could render services to the country equal to what the marine gives yet there are Gentlemen whose income from government is from five to ten thousand a year for services which hundreds of men can do when I speak of reward it is for what only three men beside myself can do that is my two friends in America and the Earl of Stanhope in England. Whether I possess such powers and for my neutrality merit ample compensation can only be known by investigating the principles and practice of the engines.

ROBERT FULTON

In his letters Fulton has made a number of references to his friends who were associated with him. In the above letter he gives the only clue as to whom they might be. At the time when this letter was written, both Robert R. Livingston and Joel Barlow had returned to the United States.

The above two letters on which he staked everything, were too important to be entrusted to a messenger, so Fulton carried them himself. In order to be sure that Lord Grenville should be acquainted with the contents, Fulton read them aloud as is shown by the following footnote:

On the 3r of september 1806 I had an interview with Lord Grenville in Downing street I entered his room about three oclock he was, alone handed me a chair I sat down near him and after a few words I read him the preceding letters, on which no comment whatever was made His Lordship only observed that he could not then say anything on the Subject and I retired.

That was the end. His work of twenty years in Europe was finished!

## Chapter XI

## RETURN TO AMERICA

Summary of the British negotiations. America used as a threat. Offer of neutrality. Fulton's review of the past and plans for the future. Appeal to Jefferson. Departure for home.

One's sympathy goes unreservedly to Fulton. He was at this time almost forty-one years old. He had fought his battle of life alone, without money, and with only such friends as he had attracted to himself from time to time. He had tried several avenues that might lead to success, but he found that one after the other came to an end in desert fields. To his latest effort he had devoted nine years. It had been the most promising of them all. It had brought him in contact with many powerful people, it had provided action that he sought, it was lighted with the bright hopes for success, and for the past two years had furnished a comfortable living, the first of any of his efforts so to do. But now this avenue like the others had reached an end. This disappointment must have exceeded all his previous disappointments. He had abandoned art, small canal construction and his excavating devices at a time when no one of them offered any great encouragement. In none of his earlier efforts had he attained a good foothold. In his submarine he had buried more time and energy than he had in any of his other lines: in fact, he had spent nearly one half of the years since leaving home in its study. Whatever estimate he had placed on art and his various engineering projects, this time he knew that he was right. There was no doubt in his own mind as to the correctness of his reasoning and the workable qual-

ities of his invention. All the harder it must have been, when he realized that he could not make men see it as he did, other than his two unnamed friends in America and his one friend in England, the Earl of Stanhope.

His emotions on sailing from England were of a distinctly different character from those he felt when leaving France. In the latter country he had been rejected with contumely, the first real shock that he had experienced. He departed from France sore and angry, as has been shown. In England he had been treated quite otherwise. Throughout his stay of twenty-eight months he had been shown every courtesy. He had the entrée to government offices and enjoyed the confidence of the highest officials, including Mr. Pitt and Lord Grenville, in turn prime ministers. The disagreement with the British Government was on financial grounds. During his period of work he had received a generous salary in addition to reimbursement for all his expenses. Development of events made Fulton no longer necessary to the Government on the one hand, while on the other his steamboat arrangement with Chancellor Livingston was forcing Fulton's return to America. Both parties were ready to end the contractual relation. The British Government, not having received any direct benefit from Fulton's ideas, except the indirect one that he had been kept from going over to the enemy, naturally sought a means of terminating the contract without further payment. Fulton, equally naturally, sought substantial pecuniary reward. He was past the age when men have usually made their mark, and had accomplished nothing. His steamboat plans were as yet on paper with nothing more definite than hope. He was in debt to his " two friends in America," a debt that he could repay by no other means in sight than through his submarine contract. He, therefore, made the best fight he could, single-handed, to obtain a favorable settlement.

It is interesting to follow the working of Fulton's mind in these final negotiations for a satisfactory adjustment, as shown by his own letters. In his original contract of May, 1804, he made no reservation, but placed his ideas wholly and exclusively at the disposition of the British Government. It does not appear that he gave any thought to the use of his device by the United States. This is not remarkable. He had left America when he was but twenty-one years old. At that time there was no constitution, no federal government, nothing but a confederacy of colonies disturbed by strong jealousies of each other. He had lived abroad for twenty years, including the formative period of a man's character. His sole tie with his native country, his mother, had been cut by her death. The Barlows were quite as much French as American. There was nothing except the friendship and personality of Livingston to rouse in him a sense of patriotism, or lead him to feel the existence of a national spirit in a united country in America.

The first reference to the use of his submarine by America appears in his letter to Lord Castlereagh, dated "London December 13th, 1805," given on pages 104–8. When this letter was written, it was becoming clear to Fulton that the British Government might refuse to make payment under the contract, and that he would have to use some sort of force to compel a compliance with the terms. The only force that he could employ would be a threat to give his secret to some other power. France was now quite out of the question, and there was no one power in Europe that could serve as a means to scare. The United States, now become a nation, was the only hope. In his letter to Lord Castlereagh he advances the ingenious solution that he receive a substantial cash payment and an annuity, the latter to continue only so long as the secret was kept inviolate by him. He concludes by diplomatically hinting that the only government to whom he would be likely to

explain his invention would be his own. In the paper that he read to the Arbitrators he makes a distinct threat that, unless a satisfactory offer be made, he will not only give his secret to America but publish it to the whole world, although he modified this by stating that he had "no desire to introduce my Engines into practice for the benefit of any other Nation." (page 126.)

Although refused by the Arbitrators, he made a final effort with Lord Grenville, on September 3rd, to obtain his pecuniary award, by again offering what he called his "neutrality." (pages 137–8.)

But the best exposition of Fulton's position is given by himself in the concluding pages of his Notes, this part being written after his letters to and audience of Lord Grenville on September 3rd. This quotation was his final word:

"I have now said suffecient of this System to enable any ingenious man to make and arrange the Engines and any maritime nation to carry the whole into effect. If I live it is my intention to give this system to the public engraved with every necessary detail and I have made these sketches and this loose description which is litte more than a sketch of my studies on this Subject In order that they may not be lost to my country and mankind in case of any accident to me,

The prosecution of this system will put maritime nations on equal means of offensive war, will give them equal means of distressing each others commerce or destroying their Ships of war and consequently will produce the liberty of the Seas. What I mean By the liberty of the seas, is that all Vessels of all nations should carry any kind of Cargo to any port of any and every nation whever (wherever?) the owners thought proper to Send her if In such port she could not dispose of her cargo or found a duty equal to a prohibition then let her go else-

where, unmolested for the perfect liberty of trade is the real interest of all mankind. Under such a system Infinate stupid causes of war will be done away, and the genius and millions which are now Expended on wars, will then be directed to useful enterprises —

With such immense and humain objects In View and which has been the great Stimules to my prosecuting of this subject, It may be necessary to give a reason for offering to abandon these inventions to the British government to use or not as they might think proper.

My first reason is that my country does not at present seem to require such engines And although I had written to Mr. Jefferson twice on the progress I had made and the final happy consequences of such a system I never had an answer from him nor do I know that I shall have the least encouragement in America to systematize these plans for the use of the Country

Second, Untill my country feels the importance of these engines and seeing the power which they possess to give liberty to the seas, and will unite with me in introducing them effectually into the world, and considering the immense advantages which America would gain from a perfect liberty of the seas, and would make my friends a reasonable compensation for the Sums they have advanced to enable me to prosecute my experiments, Untill my (" country," undoubtedly omitted) sees such advantages and does such things It is right that I Should do everything in my power for the interest of such friends and even to guard my own Interest Will any American or liberal minded man call such actions sorded and wish me to abandon years of Industry to the public good while neither he nor the government have offered one Shilling to promote so glorious an enterprise?

Third

As my country has not immediate use for such engines and the prosecution of my system may now be considered

on the broad scale of general good It is no abandonment of my plan to take some years to reflect on it and give give it to the world with every demonstration of probable success.

Fourth.

As I am bound in honor to Mr. Livingston to put my steam boat in practice and such an engine is of more immediate use to my country than submarine navigation I wish to devote some years to it and Should the British Government allow me an annuity I Should not only do Justice to my friends but it would enable me to carry my steam Boat and other plans into effect for the good of my country. It is therefore for this reason I have offered England my neutrality for the present and when I proposed an annuity it was only to continue for so long as my engines were not used by france or any other nation against England, this is doing justice to all parties and leaving me at liberty to abandon the annuity whenever my friends and I might think proper, to introduce the engines into practice.

It never has been my intention to hide these inventions from the world on any consideration on the contrary it ever has been my intention to make them public as soon as consistent with Strict justice to all with whome I am concerned

For myself I have ever considered the interest of America, free commerce the interest of mankind the magnitude of the objective view and the rational reputation connected with it superior to all calculations of a pecuniary Mind

Robert Fulton "

It will be seen that Fulton made two appeals to the President at Washington, undoubtedly when his negotiations for a final settlement with the British Government were beginning to take a discouraging turn. But Mr.

Jefferson apparently never even acknowledged his letters.

Scorned by France, played with and then rejected by England, ignored by America, Fulton with weary heart and disappointed spirit set out in October, 1806, on the return to his own country, that he had left, with only forty guineas in his pocket, but radiant with youth's hopes, twenty years before. He still had hope, and his courage had never failed him. Now, at last, he was to win his reward, in the way most dear to him, by receiving recognition of his talents. Though he had but the short space of nine years more to live, nevertheless, before they were completed he was to achieve everlasting fame through his steamboat " Clermont."

His submarine plans he had left in England. He dismissed them from further consideration in the excitement of his other success. Then came his death, and his plans lay dormant. Others were to work over the same idea and bring it after many trials to perfection, until finally after an interval of more than one hundred years, it was to become, as Fulton foresaw, a great offensive force. It was then to be used, but not as he could have imagined, against the three countries, jointly, that he served and loved in turn.

## Chapter XII

## EXAMINATION OF FULTON'S DESIGN

What the Nautilus accomplished. The British design compared with that of the Nautilus. Folding propeller. Horizontal propeller. Details of machinery. Effectiveness of the vessel. Screening the Channel.

However interesting from an academic point of view may be Fulton's views on philosophy, free trade and social problems, and his personal peculiarities as displayed in his negotiations with government officials, the animating question of historical bearing relates to the boat itself. Was the design practical, would it as developed have been able to serve a useful purpose, or was it only a single step in a long process of evolution?

The Nautilus, defective as she was in many particulars which Fulton admitted, clearly demonstrated certain facts: firstly, that a boat could be made to plunge and rise at will; secondly, that it could remain under water with a crew of three men for several hours; thirdly, that it could be manoeuvered and steered by the compass under water as well as on the surface. These features are the essence of the principle of successful submarine practice, and so much Fulton accomplished.

It is a far cry from a little vessel like the Nautilus, no bigger than a ship's boat that is carried at the davits, to a modern submarine capable of keeping the seas for many weeks, of crossing and recrossing the ocean without replenishing either stores or fuel, and of carrying not only torpedoes and apparatus for their discharge but also a 12-inch long-range gun firing a projectile weighing nearly one-half ton. Except as to size, which is not

really a basic feature of principle, the modern submarine differs from Fulton's proposals in that it possesses an engine actuated when on the surface by a fuel (oil) whose activity can be instantly stopped preparatory to plunging, and by a power (electric storage battery) that neither generates heat nor vitiates the air while submerged. For that combination of motive power the world had to wait another hundred years.

The Nautilus, as a matter of fact, was something vastly more than a toy or experimental model. It possessed real offensive powers, and a fleet of them, as Fulton proposed and as the British navy officials feared, would have been able to do real havoc. In estimating the offensive power of Fulton's design, the picture of the modern submarine must be kept out of sight. The latter is called on to meet conditions of mechanical development and types of hostile vessels that are as much in advance of those existing when Fulton lived, as is the complicated mechanism of a present-day submarine over the hand-driven propeller proposed by him.

At the beginning of the last century, a ship-of-the-line was a very unwieldly affair. She was bluff bowed and high sided and consequently could be handled satisfactorily only when "off the wind." Even under these favorable conditions, speed was comparatively slow. With a light wind, especially with a light adverse wind, she could make but little headway. Such a wind rendered capital ships practically helpless. That they were not destroyed by the opposing force was because at such times the opposing force was helpless too. A boat that had offensive power of attack and had means of locomotion enough to overcome tidal currents would have been an effective menace. As Fulton pointed out, the only measure of defense by a large vessel at anchor would lie in a cordon of small boats. But a boat fully, or even partially, submerged would have had an excellent chance

to get through a cordon and destroy her prey. In spite of the limitation of speed and cruising range that today would condemn any such boat as absolutely worthless, these limitations were sufficiently generous when compared with the status of naval architecture that prevailed in 1800–1806 to make Fulton's submarine, when he proposed it, a factor of actual and positive value.

If that can be said of the Nautilus, all the more it is true of the design that he submitted to the British Government. Between the Brest experiments in 1801 and his proposals in 1804, as evidenced by his "Drawings and Descriptions," it is clear that he had given the matter considerable thought and to some purpose. The specifications as submitted to the British agent called for a boat 35 feet long and 10 feet beam as compared with the similar dimensions of the Nautilus of 21 ft. 3 in. and 6 ft. 4 in., respectively, giving at least three times the tonnage. It was to carry a crew of six instead of three men with provisions sufficient to enable her to be kept at sea for 20 days. The offensive capacity was 30 submarine bombs (or mines) as against a single trailing one with the Nautilus. The vessel designed for the British Government was a real sea-going boat that could independently navigate the Channel while the little Nautilus could not venture far from land or from some large vessel acting as a base.

An examination of the details, particularly those on Plates First and Second will disclose many improvements over the French prototype, shown facing page 26. In the first place the hull is that of a seagoing boat, equipped with a well-developed sail plan for propulsion when on the surface and not the queer contraption that the French marine architects condemned. On the surface this boat could have been handled as easily and she would have sailed as fast as any sloop of the same size. The mast could have been laid back

on the deck and the sails disposed of in a few minutes preparatory to plunging.

To plunge and again come to the surface of the water, ballast tanks, sea valves and hand pumps provided ample facilities readily to overcome or restore excess of buoyancy. The brass cylinder with the hemispherical ends would suffice to withstand the exterior hydrostatic pressure. The required thickness of shell was a matter of computation, one readily made with certainty even in those days.

The difficulty with all early submarines was motion beneath the surface. In the British plan, Fulton proposed to obtain motion by a manually operated crank turning a propeller. The boat was larger than the Nautilus, but so also would have been the crew. For short distances he could undoubtedly have driven the boat at his estimated speed. The propeller was a two-bladed affair of modern type. Fulton had now definitely abandoned the full helical or Archimedes screw that Bushnell used and which he had himself tried in his first experiments.

Reference to Plate First and its description will show, however, an exceedingly interesting addition that Fulton had made in the British boat. He reasoned correctly that a propeller when not turning would cause a considerable drag to the boat when sailing, and thus reduce her speed. He, therefore, arranged that his propeller could be folded so as to lie horizontally. This he proposed to do by a hand crank and gearing operated from within the boat. On Plate Seventh it will be seen that the propeller when folded lay well above the water surface and so would not have been an impediment to the motion of the boat. When it is recalled that the propeller was not generally adopted as a means of vessel propulsion until after 1845, when the steamship Great Britain crossed the ocean between England and New York, the

first vessel driven by a screw propeller to accomplish the feat, and that a propeller that could be folded or hoisted above water was not introduced until about 1850, because at that period steam was merely an auxiliary to sails, it will be seen how far ahead of his time Fulton was in the design that he made in 1804.

Another radical innovation was a horizontal propeller, Marked *B* in Plate First, attached near the bow of the boat. This propeller, also actuated by a crank from within the boat, was to give the boat vertical motion when submerged and so enable it to be kept at any depth that might be desired. This principle of the horizontal propeller is that of the helicopter, the device now being experimented with by airplane designers in order to give planes a vertical motion or permit them to hover stationary in the air. It was precisely those same results in the water that Fulton undertook to accomplish with his submarine.

The other mechanism in the interior of the boat is simple and self-explanatory. There were two anchors with windlasses, one anchor to hold in the usual manner against drifting, the other to regulate depth when lying stationary. There were pumps for emptying the water ballast chambers. On deck was a conning tower quite similar to the tower on a modern submarine, which served when closed as a lookout for the helmsman, and when open as means of ingress and egress for the crew. This conning tower had glass windows through which an observer could watch his prey, or steer his course when the boat was partially submerged. Plate Fifth shows how the conning tower could be used when it should be the only part of the vessel above the surface. This particular plate is of peculiar interest in that Fulton has drawn a picture of himself looking through the glass-covered ports. In the original drawing the head is full size.

Attached to the conning tower were two pipes marked

*F* and *G* in Plate Second. These pipes led to the interior of the boat and permitted fresh air to be drawn in, and the vitiated or mephitic air (as Fulton called it) expelled. These pipes permitted the boat to be submerged so that the deck was just awash, the only part above the surface being the upper half of the conning tower and the air pipes. This is the situation as shown in Plate Fifth. So operated, the boat did not differ materially from a modern submarine under similar conditions with her periscope out of water.

From Fulton's small conning tower he had only direct vision. A periscope enables the boat to be wholly submerged with vision obtained by reflecting mirrors. But a boat submerged so as to be just awash, with only the conning tower showing, and driven by a hand-operated propeller could have entered at night unseen almost any harbor, because in those days there were no powerful searchlights to illuminate the surface of the water at a distance.

The British were right in the secret note that they sent to the naval commanders that Fulton's boat, even without the later improvements that he showed the British Government, could in the hands of the French have made an attack with very serious results upon an open roadstead such as the mouth of the Thames.

According to modern phraseology, Fulton's British boat was a submersible rather than a submarine. The latter term defines a vessel that has powers of offense under water by torpedoes that in turn have means of locomotion. With such a torpedo neither Fulton nor the art was acquainted. His torpedoes or " bombs " were immobile affairs intended to be anchored, dragged by a boat or allowed to drift with the tide and to explode by concussion.

With the Nautilus it is true that he contemplated dragging a " bomb " beneath the bottom of a ship to be

attacked, and in this respect the Nautilus possessed some feature of a true submarine. The plan that he proposed for the Nautilus presented many serious difficulties depending as it did on the fixing of a spike in the bottom of the other vessel. Fulton himself apparently reached the conclusion that this suggestion was impracticable, through actual experiments or further study. The boat that he proposed for the British Government had no such attachment, but instead was designed to carry " bombs " to be deposited secretly in an enemy harbor, and there to be anchored so as to remain beneath the surface when they would come in contact with the bottoms of passing vessels, or to be released in couples held by bridles and thus to be carried by tidal currents across the cables of anchored ships when the " bombs " would be drawn beneath the vessel and explode.

What Fulton called " bombs " are today known as mines. No means are shown in his plans by which these mines could be placed or released while his boat was submerged. The capability to submerge and to move beneath the surface was expected to permit the boat to work into a harbor unperceived, and there to lie in wait beneath the surface until night presented the opportunity to rise unseen, when the mines would be placed or set free. The successful experiment with the Dorothea showed that his mines could be completely effective and that, therefore, his submersible mine layer, as perhaps she can be correctly described, could have been developed into a very effective engine of war.

In Fulton's bombs, as he calls them, we are not particularly interested because he has fully described these devices in his book that he wrote on Torpedo Warfare. It is, however, in view of subsequent events exceedingly interesting to point out that Fulton foresaw the conditions that actually obtained in the recent war.

On pages 71–2 of the "Descriptions," he explained how hundreds of such bombs or mines could be strewn in the channel of the Thames or along the coast and it would not be in the power of the whole British marine to prevent such practice. This is precisely what the Germans undertook to do, forcing the British, even though they had control of the open seas, to sweep the Channel by daylight, day after day, in order to remove mines that might have been planted during the night. Furthermore, Fulton pointed out that a line of such mines could be strung from Calais to Dover, rendering it "impossible for any vessel to pass without certain destruction." When the German submarine attack on British commerce became seriously acute, the British authorities put into execution that which Fulton had suggested and strung a line of obstructions across the Channel from Dover to Calais thereby compelling the German submarines to pass around the northern coast of Scotland in order to reach the open sea.

Speaking of the effect of submarines and mines, Fulton's language is worthy of repetition because the sinister side of his prophecy became so nearly realized between 1914 and 1918:

> The moment this System or any other reduces the British marine to Boat fighting, the revered Sovereignty of the Seas will be forever lost; Colonies must be Abandoned and the whole influence which England holds in the scale of nations will Vanish, This is the natural and obvious consequence of this system when reduced to practice and prosicuted by a powerful nation with energy and Spirit. The Wealth of England and the existence of her fleets depend on her immense and uninterrupted commerce, But should France ever possess a means to cut off or interrupt such trade, England would be obliged to submit to any terms which Bonapart might think proper to dictate.

Substituting Germany for France and Hohenzollern for Bonaparte, we have precisely the very situation that existed in 1915, when the naval authorities of Germany expected to break the power of Great Britain, and in which attempt they came so perilously near success.

The Commission charged by the Directory to examine the plan of the Nautilus gave credit in its report on September 5th, 1798, to Fulton for having invented a terrible means of destruction since it acts in silence. That description was merited, but it remained no more than an expression of private opinion. It failed to secure for Fulton the public support to which his device entitled him. The world, perhaps fortunately, had to wait a century for the production of this engine of destruction. In the light of experience an examination of Fulton's improved plan as contained in his "Drawings and Descriptions," fully confirms the decision of the French Commission in that:

"LE BATEAU SOUS-MARIN IMAGINÉ PAR LE CITOYEN FULTON EST UN MOYEN DE DESTRUCTION TERRIBLE, PARCE QU'IL AGIT DANS LE SILENCE ET D'UNE MANIÈRE PRESQUE INEVITABLE."

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